The Behavioral Sciences and Health Care

3rd edition
Praise for This Edition

“At a time when every major report on the future of health care calls for a broad perspective and greater teamwork, it is refreshing to see a major textbook propose, as well as extensively document, an ‘integrated sciences model’ for uniting the contributions of the biomedical and the behavioral sciences in teaching and practice. This text should be required reading for all health sciences students and their faculties, as we move toward a system of truly collaborative, interprofessional health care delivery.”

DeWitt C. Baldwin, Jr., MD, Professor emeritus of Psychiatry and Behavioral Sciences, University of Nevada School of Medicine, Reno, NV

“The person, the patient, must be the focus of health care, not the system or the profession. This outstanding book by O.J. Sahler, MD, and Jack Carr, PhD, and its integrated sciences model go a long way towards making this a reality. It is more than a standard text for medical students — it should also be required reading for students of pharmacy, nursing, social work, psychology, and sociology and their attending physicians — as well as for health care administrators and politicians.”

Albert H. Eaton, Ph.D., MDiv, President of the Association for the Behavioral Sciences and Medical Education (ABSAME)

“An outstanding integration of the most up-to-date scientific knowledge gathered across disciplines, targeted for clinicians. Understandable, timely; straightforward yet pleasantly sophisticated. A wonderful desk reference for primary care providers.”

Pat DeLeon, PhD, MPH, JD, former President of the American Psychological Association

“This is a wonderful volume incorporating information normally found in separate textbooks for psychiatry residents, graduate students in clinical psychology, health psychology, social work and public health. Rarely would this information be gathered into one volume and integrated into a model that seriously considers biology and psychology. The book is especially timely as efforts at health care reform have emphasized an integrated model of medicine that takes into account genes, environment and their interactive processes. The book provides a reasoned rationale for these efforts. As advances in health and illness are made, it becomes obvious to clinicians and researchers that the boundaries between biology and psychology are less clear and more fluid. The book is comprehensive, dealing with historical topics such as Freud’s psychoanalytic theory as well as contemporary topics such as the brain networks discussed by Michael Posner, a leading neuroscientist. Traditional psychopathology is presented as well as current concerns about social and cultural effects on health/illness. The book will do much to initiate the life-long education of health professionals about these issues or as a primer for those who are new or less familiar with the interplay of behavior and health.”

Barry A. Hong, PHD, ABPP, Professor of Psychiatry and Medicine at the Washington University, St. Louis, MO

“The publication of the new edition of The Behavioral Sciences and Health Care could not come at a better time. Its editors, Drs. Olle Jane Z. Sahler and John E. Carr, are two superb senior scholars who have updated their volume just as the American Association of Medical Colleges has declared that physicians must be better prepared in the behavioral sciences if they are to understand a myriad of health problems they now must treat. The talented group of chapter authors and the breadth covered in this volume make it necessary reading for all medical students. Its readability and currency also make it a fine preparation for students about to take the Medical College Admissions Test, which has added a new emphasis on the behavioral sciences. This volume has no peer in educating aspiring physicians in how a biopsychosocial understanding of medicine’s challenges is the only approach a thoroughly prepared medical practitioner can take.”

Edward P. Sheridan, PhD, LHD, ABPP, former Chief of Psychiatry Outpatient Services and Professor and Chairman of the Division of Psychology at Northwestern University Medical School. Currently, he is University Professor and Senior Vice President and Provost Emeritus at the University of Houston.

“This textbook provides a comprehensive overview of health care that can be a valuable resource for any clinician working in a medical setting. It offers a well-rounded view of the various aspects of the biopsychosocial model that helps to integrate theory into practice. As a music therapist, it gives insight into how the medical field works from a behavioral approach, which is very much in line with the Medical Music Therapy perspective. I plan to use it with all interns as part of their orientation process for working in the medical setting.”

Rosemary Oliva Obi, MS, LCAT, MT-BC, Music Therapist at the University of Rochester Medical Center Golisano Children’s Hospital, Rochester, NY

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About the Editors

Olle Jane Z. Sahler, MD, Co-Editor, is Professor of Pediatrics, Psychiatry, Medical Humanities, and Oncology at the University of Rochester School of Medicine and Dentistry. She is a behavioral pediatrician with a special interest in the care of chronically and terminally ill children and their families, and in the treatment of children and adolescents with chronic pain syndromes using an integrative medicine approach. She has written widely on medical student, resident, and practitioner education in the areas of child development, management of behavioral problems at home and school, and palliative care, end-of-life care, and bereavement counseling. Her foundation and National Cancer Institute funded multi-institutional research over 25 years has focused on siblings and mothers of children with cancer. She has also been funded by the National Center for Complementary and Alternative Medicine of the National Institutes of Health to study the effects of using music therapy on symptom control and immune reconstitution in the management of patients undergoing stem cell transplantation.

As an educator, she was the Director of the Pediatric Clerkship at the University of Rochester School of Medicine for 17 years and the Director of the Department of Education at the American Academy of Pediatrics in 1995–1996. She was the founding chairperson of the Medical Student Education Special Interest Group of the Academic Pediatric Association (formerly, the Ambulatory Pediatric Association) and founding president of the Council on Medical Student Education in Pediatrics (COMSEP). As President of the Association for the Behavioral Sciences and Medical Education (ABSAME) in 1992–1993, she began a project to develop a comprehensive curriculum guide for medical student and resident education in the behavioral sciences that was published in 1995. An updated version of this curriculum guide, reflecting the many advances in the behavioral sciences that occurred around the turn of the century, forms the foundation for this book, now in this third edition. The authors and editors who contributed to this text represent the diverse experience and expertise of ABSAME’s membership, working in conjunction with other expert professionals dedicated to excellence in education.

A graduate of Radcliffe College/Harvard University, Dr. Sahler received her MD degree with distinction in research at the University of Rochester, was a resident in Pediatrics at the Duke University Medical Center, and completed a fellowship in Behavioral and Developmental Pediatrics/Child and Adolescent Psychiatry at the University of Rochester. She served as a Captain in the U.S. Army Medical Corps and received a Special Commendation Award for her work in child abuse in the military.

John E. Carr, PhD, Co-Editor, is Professor emeritus of Psychiatry & Behavioral Sciences and Psychology at the University of Washington where he served a four year term as Acting Chair of the Department of Psychiatry & Behavioral Sciences, was Director of Undergraduate Medical Education, and played a principal role in developing behavioral science curricula for the School of Medicine. He has written extensively about the need for an “Integrated Sciences Model” for the behavioral and biological sciences in medical education and clinical psychology graduate training. He has served as a consultant to the World Health Organization on Behavioral Sciences in Health Care Training, and co-coordinated a cooperative venture between the Association for the Behavioral Sciences and Medical Education, the Association of Medical School Psychologists, and the International Union of Psychological Societies in developing behavioral science training modules for WHO.

Dr. Carr received an MA in Industrial Psychology and a PhD in Clinical Psychology from Syracuse University. He is a Diplomate in Health Psychology of the American Board of Professional Psychology. He is a Fellow of the American Psychological Association, Association of Psychological Science, Society of Behavioral Medicine, and the Academy of Behavioral Medicine Research. He has served on the National Board of Medical Examiners Behavioral Sciences Test Committee, and is a founding member
and was twice elected to the Presidency of the Association of Psychologists in Academic Health Centers. His promotion of an integrated sciences model in medical education and graduate psychology training reflects his bio-behavioral orientation and a career-long research program focused upon identifying the mechanisms of bio-behavioral interaction in stress, anxiety, and depression.

He is the recipient of a Distinguished Educator Award from the Association of Psychologists in Academic Health Centers, the Gary Tucker Award for Lifetime Achievement in Teaching and Dedication to Education from the Department of Psychiatry of the University of Washington, and Distinguished Psychologist Awards for Contribution in Scholarship and for Contribution to the Field of Psychology from the Washington State Psychological Association.

**Julia B. Frank, MD**, Associate Editor, is Associate Professor of Psychiatry and Behavioral Sciences and is the Director of Medical Student Education in Psychiatry and Director of the Psychiatry Clerkship at the George Washington University School of Medicine and Health Sciences. Her responsibilities include organizing the pre-clinical behavioral sciences curriculum and integrating it with the psychiatry clerkship. As a graduate of the GWU Master Teachers Program, she has developed an interest in multiple modes of student learning, including team-based learning, problem-based learning, medical readers theater, medical humanities, and self-directed learning. She co-authored a question/review book for NBME Step One, which became the foundation of many of the review questions in the second and third editions of *The Behavioral Sciences and Health Care*. She became co-editor of the third edition specifically to help align it with current thinking about the role of evolutionary processes in pathology in general and psychopathology in particular.

Dr. Frank is a member of the Society of Distinguished Teachers, a former board member of the Association for Behavioral Sciences and Medical Education, a Diplomate of the American Board of Psychiatry and Neurology, and a Distinguished Fellow of the American Psychiatric Association. She was named Psychiatrist of the Year by the Washington Psychiatric Society in 2005, based on organizing colleagues to work with survivors of Hurricane Katrina. Her other scholarly writing includes co-authorship with her father, Jerome D. Frank, MD, PhD, of *Persuasion and Healing: A Comparative Study of Psychotherapy* (1991), a classic work explaining the universal processes and effects of psychotherapy, written especially for medical students and trainees in other mental health disciplines. More recently, she co-edited, with Renato Alarcón, *The Psychotherapy of Hope: The Legacy of Persuasion and Healing* (Baltimore: Johns Hopkins Press; 2012). Other scholarly interests include research into the pharmacological treatment of post-traumatic stress disorder and writing about women’s mental health, victims of violence, and various topics in the history of medicine. She has also published medical comic poetry in the *New England Journal of Medicine*.

A graduate of Yale University School of Medicine, the internal medicine internship of the Michael Reese Hospital in Chicago, and the psychiatry residency of the Yale Department of Psychiatry, Dr. Frank has provided clinical psychiatric care to chronically mentally ill veterans, medically ill patients, university students, and refugees seeking asylum. Her current practice serves outpatients with anxiety, mood disorders, perinatal psychiatric syndromes, and a wide range of other adaptive disorders.

**João Vieira Nunes, MD**, Associate Editor, is Associate Medical Professor of Physiology and Pharmacology at the Sophie Davis School of Biomedical Education at The City College of New York, City University of New York. He has been instrumental in developing behavioral science, neuropsychiatry, and doctoring curricula at Sophie Davis. He is a Diplomate of the American Board of Psychiatry and Neurology, a psychiatrist and child and adolescent psychiatrist with a special interest in brain and behavior, childhood development and psychopathology, health disparities related to sleep disorders and chronobiology, and personal narratives for the understanding of food-related behaviors. He has written widely on medical student education, on sleep disorders and chronobiology, and health disparities. He has dedicated much of his career to providing medical care in underserved areas of The Bronx and Harlem in New York City (where he still practices), to the cause of facilitating access of under-represented minorities to medical education, and to undergraduate and graduate medical education as course director currently, and, in the past, as psy-
psychiatry clerkship and residency program director. He directs or co-directs three required courses in undergraduate medical education.

As a member and former board member of the Association for the Behavioral Sciences and Medical Education, he played an important role in the development of the Behavioral Science Curriculum Guide published in 1995 to provide an educational template in the behavioral sciences for medical students and residents and their teachers.

Beyond the medical field, he composes and performs music and writes poetry, having recently published, with two other poets, a bilingual (English/Portuguese) anthology titled *True Word*.

A graduate of the Faculty of Medicine of Espirito Santo Federal University, Brazil, he completed residencies in Pediatrics, Psychiatry, and Child Psychiatry at the Rio de Janeiro Federal University. After moving to New York, he completed residency and fellowship training in Psychiatry and Child and Adolescent Psychiatry at Albert Einstein College of Medicine, and has attended the Harvard-Macy Institute for Physician Educators.
Preface to the Third Edition

In prior editions, we stressed the critical importance of combining the principles of the behavioral sciences with those of the biological sciences to develop a comprehensive understanding of health and illness. This concept of an integrated sciences model of research, clinical training, and health care delivery anticipated an explosion of interdisciplinary studies focused on the mechanisms by which biological and behavioral factors interact to influence health outcomes. Simultaneously, there has been increasing recognition that transdisciplinary collaboration among health care professionals is essential if we are to create unified, efficacious, and cost effective delivery systems.

Our objectives in this new edition are twofold: (1) to amplify our understanding of the mechanisms and processes contributing to bio-behavioral interactions by reviewing recent research advances from behavioral genomics, cognitive and social neurosciences, psychoneuroendocrinology, and other interdisciplinary research fields relevant to health care; and (2) to examine how transdisciplinary practice can promote the broader application of knowledge gained from integrating the biological and behavioral sciences in the training of all health care professionals.

The Association for the Behavioral Sciences and Medical Education (ABSAME) gave rise to this textbook through the development of a set of educational guidelines for the behavioral sciences, and has supported its evolution over the past decade. This year, ABSAME is in the process of changing its name to the Association for the Behavioral Sciences and Health Professions Education. This shift in focus and membership reflects a growing understanding that it is only through transdisciplinary efforts that we can keep the world’s population as free of disease as possible and maximize the sense of self-efficacy and well-being that is essential to living a full and productive life.

There are limits to the resources that professionals can rely on to improve and maintain the health of society. It is clear that the expertise of many different disciplines and the accountability of all members of the team are crucial elements of an efficient, effective health care system. Thus, it is incumbent on all of us to integrate scientific knowledge and apply our respective skills cooperatively toward achieving our mutual goals.

In keeping with these objectives, this text is designed to provide an understanding of how the behavioral and biological sciences interact to influence health care. It is also designed to provide information and insight from the behavioral sciences that can be applied to the clinical practice of any health care provider regardless of discipline. In the section on the Clinical Encounter, we use the physician-patient relationship as an example of the broader clinician-client relationship that is the backbone of health care. However, the professional responsibility to provide information, teach, advise, guide decision making, and advocate for the best interests of the person seeking our counsel, all with the utmost integrity, is inherent in the standards of all provider groups. We hope that the universal role the behavioral sciences play in optimizing well-being will be self-evident and that you will find these principles applicable in every health care encounter.

The Editors
A project as large as revising a textbook takes the efforts of many people who give freely of their time, energy, and expertise. When we decided that the time had come to revise and update *The Behavioral Sciences and Health Care*, our first step was to ask colleagues, trainees, and students to review the second edition critically and give us their recommendations about how to make the text even more useful and user friendly. Among all the people who answered the call, we must highlight the enthusiasm that J. LeBron McBride, PhD, MPH, Director of Behavioral Medicine at the Floyd Medical Center Family Medicine Residency in Rome, Georgia brought to the task. Dr. McBride, as a family therapist and pastoral counselor as well as an educator, has been the primary author of the chapter on the family for all editions of this textbook. He enlisted the aid of Adriana Pratt, MD, who was then a second-year resident, and Thomas L. Garcia, DO, who was then a third-year resident and chief resident at the Floyd Medical Center program, to provide comprehensive critiques of the book. It was not possible to include all of their suggestions, but their attention to detail as well as the overall *gestalt* of the book was extremely helpful in our thinking about changes in approach that we needed to consider and implement where possible.

We would also like to acknowledge the work of Barbara Schuman who has been the administrative assistant for both Editions 2 and 3. She has provided more than due diligence in keeping us organized and on schedule. We also want to acknowledge the editorial efforts of Stephanie M. Kawzenuk, BM, who undertook the task of reading and proofing the entire final copy, and the major word processing and editing tasks completed not only by Stephanie but also by Rosemary Oliva Obi, MS, LCAT, MT-BC, and Tiffany Robison, MS, all of whose expertise in human development and the therapeutic process was a critical asset in completing this project. And, our thanks to Karen Rothenburgh, who graciously stepped in to assume a major role in manuscript preparation. Finally, our thanks to Lisa Bennett of Hogrefe Publishing whose very capable editing brought the text to life.
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Introduction and How to Use this Book

In the course of human experience, people are born, mature, feel emotion, develop relationships, produce and reproduce, and struggle to cope with a myriad challenges to their survival and well-being. This book is about the diverse ways in which health can be compromised; the many factors that contribute to an individual’s predisposition, vulnerability, and resilience; the wide range of precipitating events that can trigger a disease, injury, or malfunction; and the complex array of individual differences that determine each patient’s unique response to a disease as well as its treatment.

When health and well-being are challenged, humans have, for millennia, sought the aid of healers, individuals who are purported to possess special knowledge about the etiology and treatment of various disorders. History has witnessed the evolution of health care from a spiritually based healing art to a scientifically based technical profession, reflecting advances in our knowledge of the biological functioning of the human body. After World War II, there was a gradual shift away from medicine’s exclusive focus on linear causal relationships between a disease and its biological etiology. Physicians began to refer to a “biopsychosocial model,” which proposed that psychosocial variables were as important as biological variables in determining health status.

Although a major step forward in understanding that complex interactions exist, the biopsychosocial model failed to explain how psychosocial variables actually interact with biological variables. That is, what are the specific connections that exist among the biological (e.g., neurotransmitter systems), psychological (e.g., emotional reactions to stress or memory), and social (cultural prescriptions and proscriptions about appropriate physical and interpersonal responses) factors that define health and illness, and by what mechanisms are they established and maintained? In the final decades of the 20th century, medical researchers began to explore the knowledge and methodology of psychology, sociology, anthropology, and other social and behavioral sciences as they apply specifically to medicine. Focusing on bio-behavioral connections, their studies have given rise to new fields such as behavioral genetics, behavioral neuroscience, psychoneuroendocrinology, behavioral pharmacology, social biology, and behavioral medicine.

The model presented in this book calls attention to the clinical significance of the interaction among biopsychosocial variables, and focuses in greater detail on identifying the mechanisms that interconnect these variables. We call this expansion of the biopsychosocial model the “integrated sciences model” (ISM) because it focuses on demonstrating the interdependence of the contributions made by all of the sciences basic to medicine.

In Section I, we briefly trace the evolution of health care practices and models, the development of contemporary health provider practice, and the integrated sciences model. In Section II, we present a brief review of the human nervous system and how its evolution has contributed to the unique survival capabilities of Homo sapiens. In Section III, we discuss the basic homeostatic systems and the critically important role that the stress response plays in human adaptation. In Section IV, we review basic psychological principles and the bio-behavioral mechanisms involved in sensation, learning, cognition, emotion, and social interaction and cooperation. In Section V, we review human development through the life cycle and important aspects of major developmental theories as they apply to the individual and to the family. In Section VI, we examine social behavior and groups, and the influence of culture, ethnicity, and other social factors on health and health care. In Section VII, we explore several contemporary social issues that contribute to, complicate, or are major problems in health care.

In Section VIII, we examine the organization and functioning of the health care system, the role that certain areas of special focus such as palliative care play, the rise of complementary and
alternative medicine (now integrative medicine), and some of the ethical and legal implications for patients as well as health care providers. In Section IX, we discuss the clinical encounter and examine the relevance of basic, clinical, and social science to understanding the patient’s complaints, eliciting and interpreting findings, making a diagnosis, negotiating a treatment plan, and motivating patient behavior. We also explore the importance of patients’ health literacy and provider impairment in effecting health outcomes. In Section X, we summarize the field of psychopathology, present brief descriptions of the more common psychiatric disorders, and show how basic behavioral science principles help us to understand this complex area of health care.

Each chapter in this volume begins with a set of bulleted questions designed to focus your attention on key learning points. Each chapter also concludes with a short set of review questions based on information in the text. We have chosen to emphasize ideas, principles, and established research findings, and to minimize references in favor of providing selected recommended readings. Finally, significant scientific observations from the behavioral sciences as well as clinical applications and examples have been included to make the theoretical practical.

In the Appendices, we have presented the elements of epidemiology and biostatistics that are essential to understanding and interpreting both medical and behavioral science data. Lastly, we have included more than 350 multiple-choice questions with explanations of the correct answer and why the incorrect choices are, in fact, incorrect. Some of the questions in this section provide additional review of material in the text. However, many questions are focused on new material to make the contents of the book even more comprehensive through the use of brief, directed discussions. The construction of these questions is designed to give you a sense of the kind of material and question format you may encounter later in training.

Good medicine is science artfully applied. The laws of probability should be interpreted in the light of experience and intuition, and common sense appreciated as a useful guide to decision making. Respect for the autonomy and self-efficacy of the patient will usually lead to the best outcome – although not everyone may agree with what the patient wants as the outcome.

We have tried to be explicit in defining the mechanisms of bio-behavioral interaction where they are known and to incorporate typical patient experiences where relevant. Some of the material will seem self-evident, some will seem counter-intuitive, but all derives from the amalgam of research findings from the biological, behavioral, cognitive, sociocultural, and environmental sciences that contribute to our knowledge of the determinants of health and illness important for you as well as your patients.

Olle Jane Z. Sahler, MD
John E. Carr, PhD
Julia B. Frank, MD
Joao V. Nunes, MD
Health, Disease, Sickness, and Illness

How does the World Health Organization define health?

The World Health Organization (WHO) defines health as “a state of physical, social, and mental well-being,” measured by the patient’s ability to cope with everyday activities, and fully function physically, socially, and emotionally. At its optimal level, good health provides for a life marked by spiritual serenity, zestful activity, a sense of competence, and psychological well-being.

How do disease, sickness, and illness differ?

Disease is the manifestation of impaired bodily functions. Disease is recognized and classified by the type of organ damage (e.g., cirrhosis of the liver, myocardial infarction), by functional impairment (e.g., diabetes), or by an underlying etiological process (e.g., infectious disease). Sickness refers to those behaviors manifested by an individual who feels ill or believes that he or she is ill. An individual can feel sick, yet have no identifiable disease. Conversely, someone may have a disease but not feel or act sick. Being perceived as sick or feeling sick leads to adopting the sick role relative to the rest of the community. This frees a person from the obligation to perform the tasks of everyday living without blame (“I feel too sick to go to work”). However, the sick person has obligations: (1) to pursue and accept help and (2) to adhere to culturally or professionally prescribed regimens that facilitate return to health.

Illness represents the totality of the patient’s experience, how the patient feels, behaves, and perceives his or her condition, and how others respond to the patient. Responses vary according to the person’s place within the family or community, as shaped by cultural beliefs and expectations. Beliefs about how or why the illness occurred (explanatory models) and the course the illness takes determine how the patient behaves and how the larger community responds.

Risk and Prevention

What is the difference between direct and indirect health risks?

Direct risks to health include dangerous practices (e.g., reckless driving, smoking) and various pathogenic conditions (e.g., environmental toxins, contaminated water). Indirect risks to health are lower risk practices or prevention failures (e.g., high fat diet, not exercising). While some risk factors (e.g.,
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Evolving Approaches to Health Care

Archeological evidence suggests that humans have practiced some form of health care for at least the past 30,000 years. Early human beliefs about sickness encompassed observable natural causes such as climatic events, personal behaviors, and unobservable, incomprehensible, or supernatural causes such as sorcery. Naturalistic treatments presumably involved simply accepting fate, or the use of herbs, tonics, and oils whose healing or curative properties would have been discerned empirically over time. Since healing and religion have been so intertwined in human history, treatment of supernaturally caused conditions involved rituals that were interpreted and administered by priests or Shamans knowledgeable about the relationships between the mystical and natural realms.

Recorded information about the human body and theories of health care appeared roughly 6,000 years ago in the time of the Babylonians. The Code of Hammurabi defined surgical operations to be performed, a scale of fees, and penalties for malpractice. Egyptian records from 5,000 years ago describe symptoms of abdominal, eye, and heart disorders, treatment of wounds, fractures and dislocations, and an understanding that brain lesions may be associated with paralysis of the opposite side of the body.

| What shared concepts underlie traditional and modern health care systems? |
|-----------------------------|---------------------------------------------------------------------|
| **Major systems of traditional Chinese, Ayurvedic, and Greek medicine began to evolve between 1,500 and 500 B.C./B.C.E. and constitute the basis for many current health care practices. Despite cultural and geographic differences, there was vigorous exchange of knowledge throughout the ancient world, likely through trade and conquest, resulting in common doctrines fundamental to all of these systems:** |
| 1. The universe is an integrated whole that is subject to laws governing all phenomena including human behavior and health; |
| 2. The individual is an integrated system of physical, mental, cultural, and spiritual qualities; |
| 3. Health is a state of balance (homeostasis) between the individual and the outside world, and among the elements, humors, and forces within the individual; |
| 4. All living things are endowed with a life force composed of vital energies that must be kept in balance (e.g., male/female, yin/yang) in order to maintain optimal health; |
| 5. Disease results from disruption or imbalance within the life force, an imbalance between the life forces and external events (stress), or an imbalance among humors and bodily functions; |
| 6. Symptoms represent the body’s efforts to restore balance and health; and |
| 7. Healers supplement or strengthen the body’s efforts to restore balance by applying treatments based on universal principles. |

These conceptualizations of disease and health, rooted in indigenous cultural beliefs, constitute the
subject matter of ethnomedicine (see Chapter 18, Culture and Ethnicity) and reflect an awareness of certain concepts found in both traditional and modern health care systems. Common or universal principles include the interaction and interdependence of etiological factors, the principle of “balance” or homeostasis, the influence of stress, and an appreciation of the role of the healer.

Modern concepts of health care have their roots in the writings of Hippocrates (b. 460 B.C.), credited with establishing the first school dedicated to the scientific study of medicine. Hippocratic medicine was the definitive standard for medical knowledge and professional ethics until Galen, a Roman practitioner in the 2nd century A.D./C.E., who compiled the medical knowledge of his time and began anatomical and physiological investigations. Because of religious constraints, Galen could carry out dissections only on animals. As a result, many of his anatomical findings proved to be in error, although he made significant contributions to understanding the functioning of the respiratory, circulatory, digestive, and neural systems.

Galen laid the scientific foundations for allopathic medicine by asserting that lesions in specific body organs led to dysfunctions, establishing the principle that persons schooled in the study of pathology (physicians) should be the definitive healers in society. Galenic treatments, only loosely grounded in his scientific work, were based on the law of opposites, i.e., diseases were treated with medicines or interventions that created an effect opposite to the symptom.

Despite its limitations, Galenic medicine dominated medicine for 1,400 years. His work was rediscovered in Europe through the preservation and translation of Roman, Greek, and Arabic texts and its worldwide dispersal influenced most major medical systems but, paradoxically, stifled scientific advancement. While the applied law of opposites presumably benefitted some cases (e.g., applying cooling remedies in cases of fever), it often justified inappropriate and dangerous “treatments” such as the indiscriminate use of enemas, bloodletting, purging, and other toxic and invasive procedures.

The resurgence of rationality, critical discourse, and experimental investigation that marked the Renaissance and the later Age of Enlightenment led to important advances in the development of medicine. Seventeenth century developments in the natural sciences led to important discoveries of the physical, mechanical, and chemical functions of the human body. Subsequent challenges to Galenism re-affirmed the physician’s role in mobilizing and assisting the body’s own healing efforts. This led to the development of homeopathic, osteopathic, naturopathic, and chiropractic approaches to medicine (see Chapter 31, Complementary and Integrative Medicine).

**Biomedical Model – Discipline Specific**

By the end of the 19th century, the scientific foundation of medicine included systematic observation, objective measurement, and experimental tests of theories. These activities were developed and taught within specific disciplines such as pathology, microbiology, physiology, and pharmacology. Corresponding clinical techniques gradually became more sophisticated and disease specific. Advances in microbiology, for example, showed that microorganisms contributed to disease and could be controlled by sterilization, antimicrobials, and immunization.

Medicine’s increased scientific sophistication led to intense scrutiny of the quality of North American medical training. The Flexner Report, issued by the Carnegie Foundation in 1910, critically evaluated the scientific curricula of all the medical schools in the US and Canada. The report called for the establishment of higher standards for medical education, grounded in the biological sciences and the scientific method. These recommendations became the defining criteria for the biomedical model, making medicine discipline specific. Flexner downplayed, even discounted, the contributions of the behavioral and social sciences to medicine. In consequence, post-Flexnerian medical education and practice became heavily biomedical and partly lost sight of the broader human and social context of disease and health care.

The limitations of biomedicine became glaringly evident during the two world wars, when the treatment of large numbers of soldiers suffering “shell shock” or “battle fatigue” (now post-
traumatic stress disorder) raised awareness of the influence of psychosocial factors on a patient's illness and treatment outcome. This awareness led to the development of psychosomatic medicine and psychosocial models of health care as alternatives to biomedicine. Though helpful, these psychosocial models were closely tied to the specific behavioral science disciplines of psychology, sociology, and anthropology. Their disciplinary base led them to emphasize the importance of their specific contributions, but failed to take into account how psychosocial factors interacted with biological and other etiological variables. By the mid 1970s, society recognized that a more comprehensive multidisciplinary approach to health care was needed.

### Biopsychosocial Model – Multidisciplinary

**What is the biopsychosocial model?**

In 1977, George Engel published an article in *Science* entitled “The Need for a New Medical Model: A Challenge for Biomedicine.” Engel asserted that in contrast to the biomedical model, the biopsychosocial model recognized (1) multiple determinants in the development of disease and the resultant illness process and (2) a hierarchical organization of biological and social systems that contribute to the disease and illness experience (see Figure 1.1). Each system was seen as a component of a higher, more abstract system. Therefore, change in one system would change other systems, especially those most closely linked to it. Psychological and social sciences were as important as the biological sciences in understanding the determinants of illness, and researchers began to identify specific psychosocial factors associated with specific diseases/illnesses.

Determinants of health are not simply a collection of individual psychosocial and biological variables, each linearly related to some specific health outcome, nor are they discipline-specific systems only hierarchically related to one another. Rather, health is determined by multiple etiological variables, continuously interacting via complex mechanisms, and interdependent processes (see Figure 1.2). Identifying the determinants of disease/illness requires identifying not only the biological processes involved in the etiology of the condition and the psychosocial factors that influ-

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*Figure 1.1. Biopsychosocial model. Reprinted with permission from Engel GL. The clinical application of the biopsychosocial model. American Journal of Psychiatry 1980; 137: 535–544. © 1980 by American Psychiatric Association*
Clinical Application of the Biopsychosocial Model

Since people can function normally physiologically with only one kidney, a kidney donor will continue to have normal renal functioning. In the biomedical model, once recovered from surgery, a donor returns to full health. By contrast, the biopsychosocial model directs attention to the psychosocial parameters of the donor’s and recipient’s conditions, not merely their biological functioning. This model recognizes that a donor’s recovery and sense of self-worth may be facilitated, even enhanced, if he or she knows the recipient was helped by the donation, the community applauds the donor for the gift, and the donor believes the recipient will make a full recovery. On the other hand, the knowledge of having only one kidney may leave the donor feeling damaged or otherwise impaired. The donor may feel diminished if insufficient gratitude was expressed. These latter perceptions may impair full functional recovery.

While no biomedical intervention beyond appropriate postoperative care for a donor is required, the biopsychosocial model implies that education is essential to reassure a donor of his or her biological integrity, that information about the benefits to the recipient will reinforce a donor’s sense of self worth, and that the support of family and community are essential to recovery and return to a state of full health.

These research collaborations reflect the evolution of the biopsychosocial model from a multidisciplinary view of behavioral and biological sciences as distinct but equal to a more complex interdisciplinary view that focuses upon (1) the interdependence of biological and behavioral processes, (2) the mechanisms of their interaction, and (3) the integration of biological and behavioral scientific principles, concepts, and theories into an integrated sciences model.

Integrated Sciences Model – Interdisciplinary

What is an integrated sciences model?

The survival of the human species is largely attributable to the evolution of the human brain. In response to some random but beneficial genetic anomalies and epigenetic events, the brain and the associated neuroendocrine subsystem developed an array of remarkable abilities that enable Homo sapiens to respond to threat both reflexively and by planning to avoid dangers. Over eons, these abilities evolved into a highly complex, integrated system of executive functions, which enable humans to record and learn from experience, to adapt to, anticipate, plan for, and modify those experiences, and to relate to, cooperate with, care for, and communicate with other humans. Such functions provide our species with extraordinary tools for mastering the environment and ensuring survival.

All information relevant to the interaction of the organism with the environment is processed,
coordinated, and integrated through the executive functions of the brain and its associated subsystems, in accord with basic biological and behavioral principles. In recent decades, scientists have further clarified how experience modifies the expression of genes and the structure and function of all biological systems, including the nervous system. These findings underlie the concepts of neuronal plasticity and gene-environment interaction.

In an integrated sciences model (ISM), all psychosocial and biological phenomena are viewed as interdependent and functionally interactive. The principles of interaction involve discipline specific as well as common principles and processes, such as homeostasis, stress, adaptation, learning, development, and genetic modification. The individual can be viewed as a complex integrated system of many interacting variables organized under five disciplinary domains: biological, behavioral, cognitive, sociocultural, and environmental (see Figure 1.2). Elements within each domain contribute to the individual’s condition, while constantly interacting with variables in all the other domains. As in the original biopsychosocial model, change in any domain effects a change in all the others, as the organism constantly strives to maintain optimal balance within and among domains. Thus, the concept of homeostasis applies to both psychosocial and biological phenomena.

**Stress – The Engine of Adaptation**

Any challenge to homeostasis is defined as stress. This term connotes not the commonly described situational stress, but rather the interdisciplinary principle of a “system under strain” (i.e., the systemic effects of any change, in any variable, in any domain). Challenges to homeostasis, which range from genetically regulated processes of growth to varying social and environmental conditions, initiate an adaptive response in other domains, whereby the organism attempts to resolve, cope with, and learn from the stressful condition. Stress is the engine that drives adaptation, the raison d’être for the evolution of the brain’s remarkable capabilities.

Stress, or challenge, itself is not necessarily destructive. Indeed, various stress responses allow...
Integrated Sciences Model

1. The individual is a complex integrated system of many interacting variables organized under five disciplinary domains: biological, behavioral, cognitive, sociocultural, and environmental.
2. Any challenge to homeostasis within and between these domains constitutes “stress.”
3. Variables within each domain interact with those in other domains via diverse mechanisms. Hence, stress in one domain initiates responses in all domains.
4. Challenges to the organism are ongoing and this interactive system is constantly evolving as the system is continuously adapting.
5. Disease is a byproduct of the failure of the stress response system. Therefore, accurately assessing the differential role of stress conditions and other risk factors in each domain is essential to determining the best intervention strategy.
6. Treatment or intervention itself may have additional biological, behavioral, and cognitive effects on the patient (side effects), as well as cultural and environmental impact.
7. Identifying the mechanisms and processes by which variables within the multiple domains interact is the focus of ongoing interdisciplinary bio-behavioral research.
8. Interdisciplinary research is guided by an integration of the concepts and methodologies of the sciences and disciplines that contribute to health care.

Integrated Assessment

Assessment should involve a detailed exploration of the differential and interactive contributions of biological, behavioral, cognitive, cultural, and environmental risk factors. This information informs the health care professional about the bio-behavioral mechanisms and processes that contribute to a particular disorder and, therefore, may be appropriate targets for treatment.

In the vignette below, an integrated sciences model illustrates the complexity of factors contributing to smoking addiction, and why treatments that focus only on one domain (e.g., changing a smoker’s cognitions) or one variable (e.g., stopping cigarette advertisements) are likely to fail.

Clinical Application of an Integrated Sciences Model

A patient has been advised by his doctor to give up smoking because of chronic obstructive pulmonary disease (COPD). With reduced smoking behavior as the treatment goal, we review the domains in Figure 1.2 and the variables that influence smoking using (−) after a variable if it discourages smoking and (+) if it encourages smoking:

**Biological:**
- COPD (−), nicotine dependence (+), genetic vulnerabilities (+/−)

**Behavioral:**
- peer smoking (+), social gatherings (+), social censure (−), stress reduction (+), “cool” image (+)

**Cognitive:**
- knowledge of smoking risks (−), belief “I’m invulnerable, and can quit anytime” (+)

**Cultural:**
- value systems (+/−), gender models (+), social sanctions (+), roles in interaction (+/−)

**Environmental:**
- tobacco accessible (+), relatively inexpensive (+), reinforcing advertisements (+)

the organism to learn from its adaptive efforts. The nature, intensity, and outcome of the stress response are determined, in part, by the degree of stress. Every college student is familiar with the “inverted U” shaped curve describing the relationship between stress and productivity. Too little challenge (stress) undermines motivation and may result in poor performance. Too much challenge (stress) may discourage effort and impair performance. Optimal challenge (stress) motivates and inspires, but does not overwhelm.

The adaptive success of the stress response defines individual health; its breakdown or dysfunction contributes to disease or disorder. Ironically, an over-functioning stress response may itself contribute to disease and disorder, as in autoimmune diseases where the immune system that normally protects against external pathogens attacks the host body. The bio-behavioral mechanisms of the stress response involved in adaptation and illness are discussed in greater detail in Chapter 7, Stress, Adaptation, and Stress Disorders.
The probability of changing complexly determined health behaviors is maximized only if treatments address as many of the contributing factors as possible. In the example, a multimodal approach would involve the following strategies:

- **Biological**: nicotine patches to counter nicotine dependence
- **Behavioral**: alternative work breaks such as exercise; social gatherings in nonsmoking venues; stress management training; meditation
- **Cognitive**: requiring the patient to explain to others (e.g., young people) how smoking is harmful; exposure to high-profile, high-status nonsmokers as models
- **Cultural**: encouraging family to reinforce no smoking; limiting smoking to inconvenient and uncomfortable places; encouraging the patient to join a “smokers anonymous” group
- **Environmental**: making smoking materials less accessible (e.g., raising taxes, restricting access; promoting nonsmoking social and recreational areas)

As can be seen, a multimodal treatment plan should have a significantly better outcome than a treatment plan that focuses only on a single domain. Though certain interventions may not always be practical or worthwhile, multimodal perspectives foster greater flexibility in treatment strategizing. Also, even though a specific factor may be important in the etiology of a condition, it may not be an effective target in treatment (e.g., while new drugs improve survival rates in HIV/AIDS patients, behavioral management of the social and psychological aspects of the disease is still a major focus of disease management.

In the chapters that follow, we explore the biological, behavioral, cognitive, sociocultural, and environmental domains that influence human functioning and the bio-behavioral mechanisms and processes by which factors in these domains interact and contribute to human health and illness.

### Recommended Readings


### Review Questions

1. __________ refers to the behaviors manifested by an individual who believes that she is in need of medical care.
   - A. Disease
   - B. Explanatory model
   - C. Illness
   - D. Lifestyle
   - E. Sickness

2. Which of the following theoretical models would be described as multidisciplinary?
   - A. Biomedical
   - B. Biopsychosocial
   - C. Integrated Sciences
   - D. Psychoanalytic
   - E. Psychological

3. The first school dedicated to the scientific study of medicine was attributed to
   - A. Engel
   - B. Flexner
   - C. Galen
   - D. Hammurabi
   - E. Hippocrates

Key to review questions: p. 407