Danny Wedding
Margaret L. Stuber
(Editors)

Behavior and Medicine

6th edition

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Behavior and Medicine

Dedicated to
my new grandson, Eli James Harrington Bach, with the hope and expectation that we will address the climate crisis in time for him to live his entire life in a world fit for human habitation.
– DW

Dedicated to
my children Ben and Emma, and my husband Larry, my inspiration and support for work in medical education.
– MS

Cover art:
Sparrow by Robert Pope (1989)
Used with permission © Robert Pope Foundation https://robertpopefoundation.com.

Robert Pope was a remarkable Nova Scotia artist who died at age 35 in 1992 from complications arising from his treatment for Hodgkin's disease. Reproductions of several of Pope's paintings are sprinkled throughout *Behavior and Medicine*. The following description of the painting *Sparrow* is taken from his book *Illness and Healing*.

> The view from the window of spring-time trees in first leaf and blossom, the atmosphere of burgeoning life, contrasts with the patient's sense of confinement and immobility. The world outside becomes a dream-like fantasy the patient longs to be a part of. Robert's sketchbook drawings done in Toronto in 1986 introduced the patient and window theme. The window introduces contrasts of interior/exterior, inactive/active, horizontal/vertical, human/animal. Robert also re-invents a theme that is dear to him: an animal giving voice to inexpressible feelings. The bird song suggests things the patient may not be able to see from his restricted vantage point, but can nonetheless hear. It was important for Robert to try to create images of hope as well as documenting all the struggles and challenges a patient faced. This is one of the artist's most hopeful images, as a result, it is also one of the most popular of the cancer series.

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Sixth edition

Editors

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Foreword to the 6th edition

It has been over 40 years since George Engel first proposed the biopsychosocial model of medicine (Engel, 1977). The model sought to expand our thinking to intentionally examine the interplay between biomedical factors with the psychological and socio-environmental. This transformative concept catalyzed a period – still in progress – of cognitive dissonance within medicine, and an ongoing search in medical education for how best to create educational programs that align fully with the biopsychosocial model. Despite much progress, much work remains. Although virtually all medical schools now have robust curricula in patient–physician communication and in core skills in behavioral medicine, these areas of instruction still represent the minority of what's taught in medical school. Further, within the culture of medical education, barriers to acceptance persist. It remains all too common for faculty to refer to such skills as a set of "soft skills," a pejorative that seeks to position these skills as inferior in importance to the "hard" knowledge and skills of biomedicine. Students find their attention to behavioral medicine increasingly distracted by the still heavy focus on biomedical content on the infamous Step 1 of the US Medical Licensing Examination (USMLE). The situation worsens in graduate medical education, where with some rare exceptions precious little time is devoted to these topics, whether in the classroom or at the bedside. In one observational study of inpatient rounds in internal medicine and pediatrics, social and behavioral science topics arose with virtually all patients (97%) yet were recognized or addressed only 38% of the time (Satterfield et al., 2014).

In the past decade, there have been some promising advances, including the publication by the National Academy of Medicine of the report, "Improving Medical Education: Enhancing the Behavioral and Social Science Content of Medical School Curricula" (Institute of Medicine US Committee on Behavioral and Social Sciences in Medical School Curricula, Cuff, P. A, & Vanselow, 2004). This substantive report provides a road map for the integration of behavior and social sciences throughout medical school. Also, the launch of the new Medical Colleges Admissions Test (MCAT) in 2015, with its inclusion of an entirely new section, "Psychological, Social, and Biological Foundations of Behavior," sent a very powerful message to pre-medical students about the importance of these topics in medicine (Association of American Medical Colleges, 2019). Further, it has stimulated many aspiring medical students to take undergraduate coursework in the behavioral and social sciences, which will almost certainly broaden their perspective as they enter medical careers.

With this context as backdrop, it becomes even more vital to have substantive, rigorous resources such as this book to help provide a sound and evidence-based foundation for teaching and learning in this domain. Now in its sixth edition, *Behavior and Medicine* is a tour de force, with a broad and diverse set of topics, all given rich and scholarly treatment. As such, it does justice to the important intersection between health, behavior, and medical care. As medical schools grapple with building or expanding their current emphasis on social and behavioral sciences, this book represents an ideal textbook and reference resource to support teaching, learning, and assessment. By placing a diverse set of topics in one book, it also reinforces the notion of integration, of how seemingly diverse topics and disciplines can be seen as intertwined. Motivational interviewing, for example, is not just a skill to be acquired and practiced, it's an essential strategy in working with patients with addiction. Social inequalities most certainly have ethical implications. Psychodynamic approaches are equally relevant and informative in approaching the intersection of stress and illness for patients as it is for understanding the well-being of trainees and practicing physicians, critical to addressing clinician burnout.

The journey to advance the role of the behavioral and social sciences in medicine and medical education most certainly takes another step forward with the publication of this new edition of *Behavior and Medicine*. It will become a vital resource for educators, a portal for learning for students, and an invaluable reference for practicing clinicians.

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Preface

Behavior and Medicine was first published in 1990. Since that time we have taught – and the book has been used by – tens of thousands of medical students. Some of the early users of the book are now physicians approaching their retirement years. Others who used more recent editions are just now launching their careers. We are confident that many of these readers are better doctors in part because of what they learned from our little book.

The two editors share a passion for convincing medical students that understanding human behavior is absolutely critical to their future practice, and we have been happy and congenial collaborators. We're proud that *Behavior and Medicine* has been used to educate medical students in Canada, Great Britain, Australia, New Zealand, South Africa, Thailand, Portugal, Scandinavia, and dozens of other countries as well as the original target group—medical students preparing to take the United States Medical Licensing Examination (USMLE).

Although the book clearly targets medical students, professors in training programs in nursing, dentistry, public health, social work, and psychology have adopted the book and found its content germane to their students.

All of the sample questions at the end of the book, designed to help students prepare for the Behavioral Science questions on the National Boards, have been updated and revised to reflect the current USMLE format. To help students optimize their learning, we have also added a box titled "Tips for the Step" at the end of each chapter in which the main learning targets are briefly highlighted. The student who reads the book and reviews the sample questions should have little trouble with the Behavioral Science section of the USMLE Step 1 examination. In fact, one of our most gratifying personal rewards as editors and medical educators has been the numerous students who have reported that they "aced" the Behavioral Science section of the USMLE after studying *Behavior and Medicine*.

We have highlighted all **key words, names,** and **phrases** by putting them in bold type, and we have emphasized all the *key concepts* that we think are likely to show up on the USMLE by putting them in italics. Thus, a student who does not have time to read each chapter (and, regrettably, this may include all too many medical students) can still prepare for class examinations and the Behavioral Science portions of the USMLE by reviewing the bold and italicized text.

We have worked hard to make this new edition *clinically relevant*, and almost all chapters include a Case Study illustrating the application of the principles being discussed. Every case draws on the clinical experience of the authors and illustrates how the principles of the chapter can be applied in a clinical setting.

Multiple interlocking themes link each chapter in the sixth edition. One theme is the simultaneous *poignancy and beauty of the transitions of life*. As children we were filled with awe and fascination; later we worked through the turmoil of adolescence; still later we each trembled at the touch of a lover. Some of us will be fortunate enough to grow old with someone we care about deeply. All of us will die. Those students who take time to appreciate the majesty of this unfolding will be better physicians and more effective healers.

A second theme of the book is the *salience of the sense of self*. Every cell in the body changes with age and time, but a continuing awareness of self, a continuity of personal identity, significantly shapes and influences our behavior.

A third theme is reflected in the title of *Behavior and Medicine*. Morbidity and mortality are profoundly affected by how we behave; what we eat, drink, and smoke; whom we choose as our sexual partners; how often we exercise; and whether we take medicines as prescribed. Most people are aware of the factors affecting their

health and yet continue to engage in maladaptive and harmful behavior. Only the most naive health-care provider sees his or her job as simply telling patients how they *should* behave.

A final theme of the book is the *brevity of life and the certainty of death*. The art and poems that illustrate every chapter in the book often portray scenes or descriptions of death. We believe awareness and acceptance of death can make life richer, fuller, and more meaningful.

We have spent our entire professional lives as medical educators and practitioners, and we are grateful to have had careers that allowed us to combine clinical practice with research, writing, grant management, and teaching. However, as we look back on our careers, nothing has been more satisfying than our thousands of interactions with medical students, both in and outside the classroom. We are especially grateful for the many students who have told us that they became better doctors because of the classes we taught and the books we edited.

Resources for teachers, including an instructor's manual, are available via the publisher's website at https://www.hogrefe.com

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One of the pleasures in editing a book is the brief opportunity to thank the many people who contribute to it. We especially appreciate the chapter authors who were patient with our frequent queries and multiple revisions of their work. Every contributor is a seasoned medical educator, and all are prominent authorities in their respective fields.

We benefited tremendously from comments made by our colleagues in the Association of Directors of Medical School Education in Psychiatry (ADMSEP), the Association of Psychologists in Academic Health Centers (APAHC), and the former Association for the Behavioral Sciences and Medical Education (ABSAME). Many of these individuals use *Behavior and Medicine* as a text, and a significant number are chapter authors in the current edition. These colleagues made dozens of helpful suggestions that have been incorporated in this new edition.

Danny worked closely with Sue Edwards in preparation of the chapter on medical ethics. Sue is a world-class ethicist, and she collaborates with Danny in teaching medical ethics to students at the American University of the Caribbean in Sint Maarten. She has been a superb mentor and a cherished friend.

We appreciate the congenial support of Doug Pope and the Robert Pope Foundation. The Foundation helped us identify a series of new paintings we have included throughout the book, as well as the painting we selected for the cover. Other artists whose work has been used as covers for earlier editions of *Behavior and Medicine* include Norman Rockwell, Pablo Picasso, Jose Perez, Edvard Munch and Gustav Klimt.

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Contents

Part 1

Mind–Body Interactions in Health and Disease

1 Brain, Mind, and Behavior

Daniel J. Siegel & Madeleine W. Siegel

> To speak, to walk, to seize something by the hand! . . .
> To be this incredible God I am! . . .
> O amazement of things, even the last particle!
> O spirituality of things!
> I too carol the Sun, usher'd or at noon, or as now, setting;
> I too throb to the brain and beauty of the earth . . .
>
> WALT WHITMAN
> Song at Sunset
> *Leaves of Grass*

What does a professional in the art of healing need to know about the science of the brain and the nature of the mind? How does knowledge about the brain and its influence on behavior enrich clinical practice? Why should a practitioner who works to help alleviate the suffering of others invest the time and energy into understanding the brain and behavior when there are so many other details to learn about illness and treatment? The simple answer to each of these questions is that in order to understand how to treat people, we need to understand how patients experience their illness, how they perceive their encounter with you, and their behaviors that may support a path toward healing. At the heart of a person's inner experience and outer behavior is the mind.

One dictionary definition states that the mind is "considered as a subjectively perceived, functional entity, based ultimately upon physical processes but with complex processes of its own: it governs the total organism and its interaction with the environment." The mind is often viewed as synonymous with the psyche, the soul, the spirit, and the intellect. From this perspective, the mind is not distinguished from the "heart," and thoughts are not separated from feelings. In this chapter we will explore the ways in which we can view the mind as the core of a person's evolving identity. The ways in which that person responds in an interview, a diagnostic test, or a discussion about potential illnesses, and his or her specific attitude and approach to treatment are each a function of that person's mind.

One aspect of the mind is a process that regulates the flow of energy and information. Your mind is taking in the information of these words at the moment you read them. You are investing energy in the reading of this

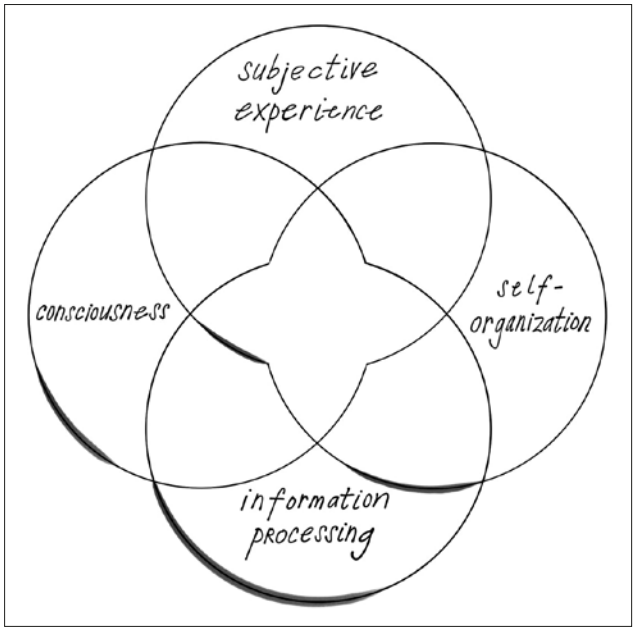

Figure 1.1 Four facets of mind. Illustration by Madeleine Siegel, © Mind Your Brain, Inc. First published in Siegel (2018).

sentence, and the layers of information processing beneath your awareness are making linkages to ideas and facts you've thought of in the past. In fact, most of the flow of energy and information – the essence of our minds – is beneath our awareness. Mental activity, such as feeling and thinking, can enter conscious awareness and subsequently be shared within our own conscious mind and with other people. When the important feelings and thoughts in our nonconscious mental lives remain out of the spotlight of conscious attention, they can still influence our decisions, reactions, and behaviors. This is true whether we are professionals or patients.

In this chapter we'll be offering you a way to think about the mind at the center of human experience that includes subjective experience, consciousness, information processing, and the regulatory process of self-organization (see Figure 1.1). The benefit for you in reading through this chapter will be that you'll gain a new perspective into the minds of others, and perhaps even your own. This skill can be called "**mindsight**" and permits us to see and shape the internal world. Research has now clearly shown that knowing your own mind can help you in many important ways in your work as a clinician. Because of the necessary brevity of this discussion, only major concepts will be highlighted. If you are interested in further reading you may find the works cited in the Suggested Readings to be an excellent way to learn more about this fascinating topic.

> The separation of psychology from the premises of biology is purely artificial, because the human psyche lives in indissoluble union with the body.
>
> C.G. JUNG

Brain and Mind

You can see from the definition given above that the mind has the interesting quality of being "based ultimately upon physical processes" but that it also has "complex processes of its own." The mind is a subjective entity, meaning that we each experience within us the process of mind that may not be wholly available to objective, and especially quantitative, analysis. The reason we need to pay attention to subjective mental life is that objective research shows us that physical health is directly related to mental well-being. The subjective nature of the mind and the mind's well-being are, in fact, some of the most important contributors to physiological well-being. For example, studies have quantitatively proven that *how patients focus their attention during a medical treatment, such as "light therapy" for psoriasis, has a profound impact on the outcome of medical interventions.* People who practice a form of attending to the present moment, called **mindful awareness**, have been shown to have improved immune function, reduced inflammation by alterations in epigenetic regulation, and optimization of telomerase levels that help repair and maintain the ends of chromosomes. Physicians trained in mindful awareness also have diminished stress from their intense medical practices. The focus of attention literally means how you regulate the flow of information – i.e., how you regulate your mind. Our mental life directly affects medical states – such as those of the heart, immune system, and lungs.

You may be wondering how a "subjective entity" such as the mind can affect the physical processes of the cardiovascular system, the regulation of genes, or the activity of the immune system. One way to explore this relationship between mental function and physiology is to take a look at the connection between the information and energy flow of the mind and the physical activity of the brain.

Many disciplines of science are concerned with understanding the mind. One of those fields is the fascinating area of neuroscience, the study of the structure and function of the nervous system. Branches of this field study specific aspects of neural functioning, such as how the activity of the brain is associated with thinking, emotion, attention, social relationships, memory, and even moral decision-making. Taken as a whole, the field of neuroscience has been exploding with new insights into the correlation between the brain's function and internal mental processes affecting the outward expression of behaviors. The numerous and expanding insights into brain-mind correlations have direct relevance for the clinical practitioner.

> Future generations, paying tribute to the medical advances of our time, will say: "Strange that they never seemed to realize that the real causes of ill-health were to be found largely in the mind."
>
> LORD PLATT
> Professor of Medicine, Manchester, UK
> *British Medical Journal*

Neural Activity Correlates With Specific Mental Processes

While science demonstrates correlations between activity in the brain and the subjective experience of the mind – as with emotion, memory, attention, and thought – we can only say at this point that these are associational findings. In other words, *neural activity in one area of the brain at one point in time correlates directly with mental activity of a certain type.* Here's one example: When you look at a picture of, say, the Golden Gate Bridge, we know that the posterior part of your brain, in the occipital lobe of the neocortex, will become active. You may already know that this back part of your brain has been called the **visual cortex** because of this association. We even know that if you *remember* the visual scene of the Golden Gate Bridge, that same area of the cortex will be activated. In fact, remembering anything you've seen will activate that posterior region.

But here's a new finding that puts a slight twist on what we should call that area. It's been known for some time that blind people use the occipital cortex to process what they feel with their fingers, including the raised letters of Braille. A study examined the brain function of people who volunteered to be blindfolded for five days and use only their fingers to feel their way around the controlled environment in which they lived during that period of time. Without the input of their optic nerves during that sightless period, the input from their fingers became dominant in influencing the activity of their occipital lobes, and their occipital lobes were activated whenever they touched something with their fingers.

What does this mean? This study proves that *the brain is an ever-changing, dynamic organ that is extremely responsive to experience*. Also, as this study reveals, the precious information-processing real estate of the brain is open to "the most competitive bidder." In the study just described, the now dominant input from the fingers to sense the spatial world came to be "processed" in the occipital lobe. In fact, some researchers have suggested that the visual cortex be renamed the "spatial cortex." For us, the important issue is that our five senses and where we focus our attention directly shape the neural architecture and function of the brain.

The overly simplistic view that the mind is "just the activity of the brain" can mislead us into reductionistic thinking and unhelpful conclusions. In the example given, our minds can be understood to harness any neural machinery necessary to create a three-dimensional perspective and image of the spatial world. In fact, a range of studies has demonstrated that how we harness the flow of energy and information – how our mind functions with the focus of attention – can directly shape the connections in the brain: "*Where attention goes, neural firing flows, and neural connection grows*" is one way to remember how the mind can change the brain. Some people even believe that the mind "uses the brain" to create whatever it needs. In this chapter, we embrace this open dimension of the associational and bi-directional influence of mind–brain relationships.

Mental Experience Occurs as Neurons Become Active

Mental processes occur when neurons fire. Whenever you think of "experience," try translating that, in part, into the idea of "neural firing in the brain." That is to say, every time you have an experience, there is specific activity occurring in your brain where only certain clusters of neurons are becoming active. The benefit of this thinking is that it helps you understand aspects of how the mind works. The firing of neurons can lead to a cascade of associated firings because the brain is an intricate, interwoven set of web-like neural circuits. Specific regions in the brain are devoted to specific forms of mental processing, such as spatial perception for the occipital regions, as we discussed earlier. Knowing a bit about brain anatomy can therefore inform us about the functional architecture of our mental lives. The more we can understand the underlying structure and function of our internal, mental lives the more we can understand ourselves and patients. In fact, studies of the doctor-patient relationship reveal that such an understanding of others' minds, called **empathy**, is one of the more important factors in determining the extent to which clinicians can help others with their difficulties.

To understand the mind in a deeper way, we are turning toward the brain for scientifically based insights that can build our capacities to be empathically sensitive to the subjective lives of others. Here we are starting with the principle that mental processes emerge as neurons fire in specific areas of the brain. What does **"neural firing"** really mean? Recall that the basic cell of the nervous system is the neuron. This long, spindly cell reaches out to other neurons to connect at a space called the **synapse**. Synaptic junctions are generally at the receiving neurons' **cell body** or its **dendrites**. The electrical current, known as an **action potential**, passing