



The Biopsychosocial Model: Interdisciplinarity in Science and Medicine

jur interviews Drs. Ader and Brown

Dr. Robert Ader, a basic science researcher who is considered the father of psychoneuroimmunology (PNI), and Dr. Theodore Brown, an esteemed scholar of the history of medicine, discuss what role interdisciplinarity plays in medical research with respect to the biopsychosocial model.

jur: What is the biopsychosocial model?

Brown: The biopsychosocial model was first articulated under that label by Dr. George Engel in a now-classic paper published in the April 1977 issue of *Science*. Essentially, the model puts the usual biomedical understanding of physiological, clinical and pharmacological phenomena together with the psychosocial dimension in one comprehensive, multi-layered model. In that form, with that language and with that vocabulary it was quite a novelty and began a life of its own. Using that paper essentially as its origin, people started to refer to the biopsychosocial model and have since built a 25 year history mostly in clinical literature.

My interest as a historian is to look for antecedents of the biopsychosocial model. I can trace those origins back to the very beginning of the western medical tradition and have found comprehensive evidence that people are trying to integrate psychological and biomedical dimensions right through the classical writers in the western tradition, right through the middle ages, through the modern period, and so on.

My interest as a historian is to ask what Dr. Engel perceived to be the novelty of his formulation in 1977, assuming that the biopsychosocial model was this long-standing tradition with special twists and turns in the twentieth century, and that Dr. Engel was both exposed to and part of that tradition. And also, what were the historical forces that stimulated him to come up with this new formulation of a concept that actually has such deep roots in history? My simple answer is that he thought the earlier biopsychosocial approaches, though not so labeled, were being threatened and challenged in the 1960s and

1970s, and in the face of that challenge he felt the need to restate and reformulate the biopsychosocial model in powerful terms to give it new life and the prospect for additional influence in the future of medicine. The emphasis there is that it is very much a clinical orientation rather than a scientific orientation.

Ader: Yes, I was going to add the clinical if you hadn't because that's where George Engel was coming from. The history you talk about was more theoretical or conceptual than it was practical. There were a few cases in which it was practical – things you might call alternative medicine today. But I think it was not so much to correct what existed before; his ideas were stimulated by his clinical experiences. What is interesting is that you can also find this in the writings of people who were not behavioral scientists. One of my favorite people to quote is Rene Dubos, a microbiologist; if you read some of his passages, he clearly rejects the biomedical model and its limitations from an experimental point of view. It is totally restrictive and has no bearing on the way things really work in the real world.

jur: How has the biopsychosocial model been received by the medical and scientific communities in both the past and the present?

Ader: The vast majority of people adhere to reductionistic strategies, so there is more lip service to than actual implementation of the biopsychosocial model. The reasons for that are both theoretical and practical. Theoretical reasons include, for example, that you are taught that the scientific method includes certain strategies requiring you to eliminate all variables except the one you are interested in to get valid results. This reasoning is why studies are done *in vitro* – you've gotten rid of everything except exactly the variable you're interested in. The problem with this approach, though, is that it's not the way the real world works and those *in vitro* studies don't necessarily

generalize to the *in vivo* situation. That's one reason why I think it has been easy to fall back on reductionistic strategies: it was training. Also, to be more direct, that's where your bread is baked in the biomedical sciences – the practicalities of promotion and advancement depend upon publications and almost necessitates a model that will produce a great deal of data, but you don't necessarily question the ultimate value of that data.

Brown: What Dr. Ader said about lip service is very important. I think that a department chair or a dean of a medical school will often speak in biopsychosocial terms because it's like motherhood – it's the right thing to say. But at the same time, that very person as dean or chair might support primarily *in vitro* research without looking into the other variables. Just as no one would be against diversity as an idea, it is very hard to imagine one being against the biopsychosocial model. To add another dimension to this, often the biopsychosocial language and philosophy is a rallying cry for some clinicians who feel they are being overshadowed by research-dominated priorities. At least at this institution, the people who would generally be the most vigorous proponents of the biopsychosocial approach are those who are defending their clinical sensitivity and the need to train students in the techniques that will help elaborate the model, such as good interviewing techniques to create a conversational connection with patients, rather than simply using laboratory diagnostic testing and the like. That split between the clinicians and the hard biomedical bench scientists was given a fundamental challenge with the development of the area in which Dr. Ader is a great pioneer: the psychoneuroimmunological approach. In my view as a historian, psychoneuroimmunology came as a great shock because there, in the midst of the biomedical approach were unmistakably rigorous investigations and undeniably powerful evidence that seemed to question some of the foundations of the biomedical approach from a research point of view rather than a clinical one, and from hard data rather than from rhetorical pronouncements.

jur: Dr. Ader, would you mind describing your research?

Ader: Broadly speaking, I research the interactions between the brain and the immune system. I use the word "interactions" specifically because there is information flowing in both directions. It was long assumed that the immune system was autonomous, so when we came along and questioned these cherished assumptions, we expected the kind of responses we received. My research is primarily concerned with the nature of relationships between the nervous and immune systems at a number of different levels. We are now doing clinical research, but mostly it has been an animal research laboratory. The field started primarily as one that was concerned with the effects of behavior on the immune system; now there is an equivalent amount of work dealing with the effects of the immune system on behavior. The pathways are basically the same; some originating from the nervous system, while some of them originating from the immune system. That is the basic notion of psychoneuroimmunology.

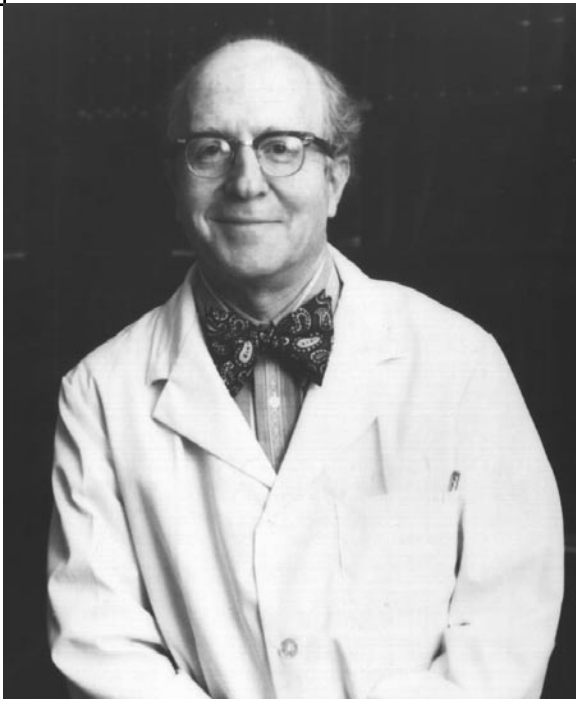
jur: What do you see as the advantages of using an interdisciplinary approach in basic science research?

Ader: From my point of view, the first advantage is that it is a closer approximation of how the real world works. In my opinion, it doesn't really make a lot of sense to study responses that don't even occur in intact, behaving organisms. Let me give you a concrete example. There has been a lot of press recently about a study purported to be the first one to rigorously test the effects of optimism on cancer survival. Well, it wasn't very rigorous and certainly wasn't the first. However, the critical problem is that they made a big point of something that is clearly not demonstrated. Here is a disease, a certain type of cancer, from which only ten percent of people survive, no matter what you do. Now, you try to determine if optimism is going to have an effect on a disease from which only ten percent survive. So optimism has no more or less an effect than chemotherapy or anything else. But now the whole notion that some psychosocial factor may influence cancer is being thrown out the window. I'll agree that optimism may be good, but you need to think about the simplicity of the model that was set up: A) it was "cancer" – it didn't make any difference what kind of cancer; and B) there was no consideration of qualitative or quantitative differences among individuals.

You are exposed to germs all the time, but as Dubos said, you are not subjected to pathogens via a route or in a dose that will unconditionally elicit disease. You are subjected to doses that are sub-clinical in a sense, so the question is: why do some people get sick while others do not? If you want to test if optimism or humor has any influence on disease, you don't test it in a model where everyone is going to die anyway; you test it in a model where it could go either way. You only find out whether or not it has an influence when you have the latitude to see the influence.

Brown: One of the things that you can see in a broad historical prospective is that much of biomedical research over the years has been like looking for your keys in a dark alley only near the lamp post because that's where the light is. It's not necessarily where the realities that need to be explored are, or where the complexities that come close to the clinical situation may be, but it is convenient for a model. People perceive it as though they are actually finding something, but in fact they have already oversimplified their parameters. Another very general observation would be that some areas of medicine commonly regarded as rigorous and well-established have, in recent years, been shown to be less than rigorously founded. If evidence-based medicine is a new thing in various clinical and surgical disciplines, then that suggests that there wasn't that rigorous and well-established evidence in the management of stroke and many other fields until people suddenly realized we don't really have the rigorous basis for examination.

Some of what clinicians encountered over the centuries were what I call glimpses of the psychoneuroimmunological relationships. They may not have had a theoretical understanding, they certainly didn't have a good scientific



Dr. George Engel, whose 1977 paper in *Science* revitalized the biopsychosocial model.

understanding, but just by being open to the clinical experience, they could see certain connections between the emotional and physical states at the margins of infectious disease or other disease processes. They got a glimpse of something that has been passed down as the lore of medicine that is now in many cases finding its scientific validation. Those glimpses came not so much from theory in all cases, but from good bedside observation and an openness to take in the phenomena even if people did not understand what the phenomena were really about.

jur. How does the interdisciplinary research in the basic sciences like psychoneuroimmunology complement the biopsychosocial model which is normally applied to the clinical environment?

Ader: I don't know that it complements it, it's the other side of the coin so to speak; its part of the model. Interdisciplinary research is not done to support a model derived from clinical observation. It attempts to relate things that are going on at several levels of organization – from the cultural to the molecular. Those levels change depending on what

you are doing. In a world that accepts the biomedical model, it provides evidence in support of the biopsychosocial model.

I thought it was fascinating that, when we showed that we could condition changes in the immune system thus demonstrating a functional relationship between the brain and the immune system, that was not enough to satisfy people that there was a connection. If you demonstrated that there was a neural connection between the two, even though you don't know what it's there for, that was enough to do it. So people accept different kinds of evidence with different degrees of support or belief, because a lot of this is about belief systems.

You have to play according to the rules that are laid down by the biomedical community, and you don't make changes like this from the outside; you only make changes like this from the inside. I am critical of the reductionistic approach, but I'm not implying that these people don't understand or that they're not bright or anything like that. If you provide the kind of data they understand, they will come along. But you have to provide that kind of data because those are the rules of the game. If that means you have to be more righteous than the righteous, then so be it. Those are the rules of the game and you can't just take your ball and go home.

jur. In light of that, where do you see the whole field going, in terms of interdisciplinarity? Do you see the biomedical and the biopsychosocial models fusing, or do you see them drifting apart?

Ader: I think I'm sort of in a pinch. I'm certainly in a pinch with psychoneuroimmunology. It comes along, everyone gets excited about it and you have people from different disciplines getting involved. Then as soon as they get a piece of it, they again fall into their old way of doing things and extract that little piece of it from the work whole. The notion is that someday we'll put it together. Well, that someday rarely ever comes for most things. In the long run, I believe

the biopsychosocial model will win out simply because it will be shown to be a better predictor of health and illness. It will win out because it will lead to new and different approaches to treatments.

Brown: I wouldn't be so optimistic. I think that there are these ongoing tensions now, but if there is some new magic bullet that comes from either microbiology or genetics it will flood the field for a very long time, and some of these very sophisticated approaches will at least temporarily be lost. There will be people who will still pursue them, but they won't have the popularity and visibility, they will sort of be drowned and put into the shadows by the bright new light. That's actually a recurrent phenomenon that I see in medical history. When you have a new discovery, whether it be Pasteur in the 19th Century or recent discoveries of penicillin, there's such a desire for them and they play so well, they're so sexy, and they're so easy to market, both figuratively and literally, that they just overwhelm the rest of the field. And I would like to believe that we've now reached a new plateau of sophistication, but I'm not convinced that we really advance in this continuing dynamic and alternation.

jur. Is there any way that undergraduates can get involved in any aspect of this research?

Brown: I was just going to say that there's lots of historical work; there are all sorts of untried areas that would be rewarding to investigate. I've had some students over the years who have enjoyed doing this and would welcome more, if I could put a little plug in there.

jur. In terms of interdisciplinarity, what valuable lessons can students take away from the biopsychosocial model, whether or not their interest is in science?

Ader: I think what happens to undergraduate students and beginning medical students is that the biopsychosocial model simply reinforces the beliefs they had when

they came here. They already have this interdisciplinary mind-set; I think it was part of the reason they decided to be physicians. So then you have to ask the next logical question: "What happens that changes student attitudes?"

Brown: There are seductions along the road that deflect them.

Ader: Very practical ones.

Brown: Very practical ones. If they want to make it in this particular lab, then they're going to do what that lab is doing, and they may lose sight of the broader connections that they may still really be interested in, but that's not how they can develop the next stage of their career. Get the funding, get the support, get the mentorship they need.

jur: So, being somewhat idealistic or keeping a broad ideal are both qualities that will ultimately help them with a holistic career?

Brown: One hopes, one hopes. But there will be lots of pitfalls along the way.

Further Reading List:

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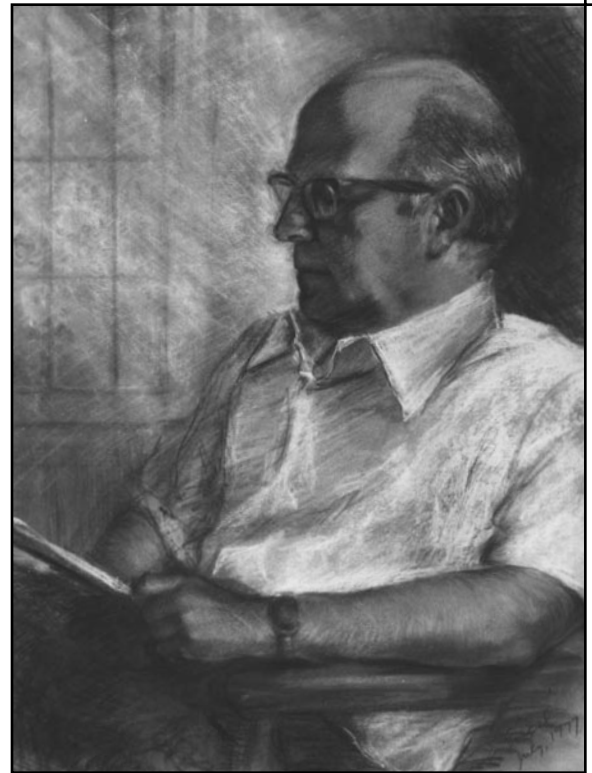
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A sketch of Dr. George Engel.

