J Behav Med (2019) 42:5–11
https://doi.org/10.1007/s10865-018-9960-5

Behavioral Medicine: a retro/prospective view of the field

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Received: June 18, 2018 / Accepted: July 31, 2018 / Published online: March 1, 2019

Abstract The year 2017 was the 40th anniversary of the convening of the Yale Conference on Behavioral Medicine (Schwartz and Weiss, 1977). In honor of this defining moment in the history of the birthing of behavioral medicine as a formal integrative field of biobehavioral theories, research and applications, we were invited by the editors to take a retrospective and prospective look at the field. Recognizing that much has been written about this history over the years, we decided to write about the "back-channel," presenting never-before shared events associated with the birthing and evolution of the field in a way that would be fun to write and read. In the process we look back at the evolving definitions of behavioral medicine in light of contemporary advances and controversies in science. Our review includes a discussion of some of the present challenges/opportunities, and then considers the future with some "outside the box" possibilities. We outline some of the enormous advances which have taken place in technology since the 1970s and consider how such technologies can be *transformative* in redefining our field.

Keywords Yale conference on behavioral medicine · Psychosomatic medicine · Health psychology · Biopsychosocial · Systems theory

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Introduction

OMG! Can it really be 40 + years since several brave souls gathered to explore how to characterize what we all believed was a unique perspective to address complex health/illness issues, but felt like the 12 blind men and the elephant… each of us had one part of the elephant, but describing the total elephant… well, that's where the fun began.

When John Ruiz and Alan Christensen asked Gary and me to write something commemorating the 40th anniversary of the "Yale Conference" (Schwartz & Weiss, 1977; 1978a) (more on this later), we were both incredulous that so much time had passed……and that we were, well, getting old (more on this later). Acknowledging this fact also admitted to ourselves that a great deal had already been written about this topic, so what could we say that might keep the reader from using these few pages as a bedtime lullaby?

"What about writing about the 'back-channel', never-before shared events associated with the 'birthing' process of this "elephant?" As the readers would probably be more familiar with the current state of affairs in behavioral medicine than we were, we could perhaps say just a few words about some of the present challenges/opportunities…….and then consider how the enormous advances which have taken place in science since the 1970s could provide us with the tools which could be *transformative* in redefining our field.

Both Gary and I thought this might really be fun to write as well as to read, so I agreed to take on the first part (a slightly whimsical, very personal accounting of what transpired during those early years). How we were able to stimulate the NIH to recognize the potential value of behavioral medicine research by creating a more level

playing field in terms of peer review, grant funding and program support. How to challenge those scientists to collaborate within a multidisciplinary "biobehavioral" framework, requiring excellence in both the biomedical and behavioral/social science components of their grant applications to successfully navigate the "system". Gary agreed to pick up where I left off (if the reader was still conscious) and would have you consider how what we know today (e.g., internet, space travel, AI, Big Data, the Human Genome Project, medical technology, stem cells, VR, personal computers, cell phones, to mention just a few advances in the past 40 + years) could provide "portals" to apply the behavioral medicine "model" to improving/maintaining health at both the individual and population levels.

A personal retrospective of events leading up to the Yale conference (February 1977)

It is late 1974, and I have just participated in my first National Heart and Lung Institute Director's meeting, representing my boss, who is head of the Office of Prevention, Education and Control (OPEC). After one hour, I can't wait to leave…. I am very discouraged….feeling I had made a terrible mistake in taking a job where everyone spoke a language I didn't understand (acronyms), not a word. I had been hired for a position in the new office (OPEC) because of my research on psychological factors affecting recovery from open-heart surgery. However, I didn't have the slightest idea of where to begin to comprehend the NIH bureaucracy, let alone how one might create opportunities for researchers to obtain support for worthy projects.

Fortunately, my colleagues at NHLI (soon to be NHLBI in 1976) took pity on my plight and took me under their wings, beginning with NIH 101, i.e., describing the workings of the system (Weiss & Shields, 1980); I learned two important lessons:

(1) The entire system is governed by peer review (Weiss, 1978a). You must identify capable individuals, groups and organizations outside of NIH who can represent the highest quality research in your area. For example, the American Heart Association (AHA) represented the cardiology community, the American College of Cardiology represented the more senior and accomplished members of that community. Members of both organizations routinely served on NIH advisory committees, study sections and NHLI/NHLBI's National Advisory Council; such groups were instrumental in recommending what research programs should be funded as well as the development of new areas of scientific endeavor which should be encouraged by the Institute. (WE HAD NO SUCH ORGANIZATIONS).

(2) The study sections of the NIH are the "backbone" of how NIH determines what constituted meritorious research (and thereby what science will be funded). In reviewing my first 15 NHLI grant applications relevant to what today might be referred to a behavioral medicine study section that had been submitted for the previous review cycle, I noticed that only one received a potentially fundable score. When this situation was brought to the attention of the NHLI Director, he said "What's the matter with your people, don't they know how to write grants or do research?" Chastened (but determined), I reviewed the rosters of the 11 study sections who reviewed the 15 applications. It became obvious that none of these groups contained scientists who were knowledgeable about biobehavioral research (WE HAD NO STUDY SECTIONS DEVOTED TO OUR AREA OF SCIENCE).

The solution to #1 meant we had to somehow stimulate our scientists to create scientific and professional organizations that could credibly represent our area of science. Unfortunately, we were still at the "12 blind men" stage and were not ready to bring together senior scientists who could discuss what the elephant actually represented (and what it did not represent) and to come to an agreement of what we should call this elephant.

#2 The NIH Division of Extramural Affairs (DEA, now called CSR, Center for Scientific Review) conducts the majority of reviews of research applications submitted to NIH and at the request of other Federal agencies. I was told by my boss not to waste my time trying to influence the study section process; they would not be receptive. Nevertheless, I scheduled a meeting with the person responsible for the creation of new study sections to discuss options for gaining genuine peer review for our extramural scientists. We got along quite well (both of us were pilots); however, he was quite skeptical as to whether there were a significant number of such applications to warrant a special study section. I suggested that I be given access to the previous cycle of applications (those were the days of paper applications) to see if I could identify a critical mass of applications NIH-wide. He smiled and said "We had over 7000 applications last round. Are you serious?" "Yes, if you can provide the space". He replied "I've got that big conference table here in my office, you can sit there. For three days I sat reviewing 7000 applications provided by his staff. I identified 55 applications NIH-wide, reviewing with him why they shared a commonality that would support being reviewed by their peers. After a few rounds

of haggling, he agreed to create an adhoc study section…. for one year. I sent him a suggested roster of study section members. The rest is history….the Behavioral Medicine study section was chartered as a permanent study section the following year with Dr. Joseph Matarazzo as its Chair. Today there are several standing and adhoc study sections providing genuine peer review for our applications.

Yale conference

By this time (1975–1976), it seemed that we were ready to convene this group. Gary and I and a small group of behavioral and biomedical scientists had spent many hours discussing how, where and when this meeting might occur and who should be invited. During his graduate training and assistant professorship at Harvard, Gary had been a pioneer in biofeedback and behavioral approaches to the treatment of hypertension. He had been a past President of the Biofeedback Research Society (now the Society for Applied Psychophysiology and Biofeedback), and he had served as a member of the Personality and Cognition study section at NIMH. Gary participated in one of my very first working groups. Besides personally loving animals and African Art, we professionally shared a passion for general systems theory which fostered big picture thinking (i.e. seeing the total elephant) as well as a deep appreciation for details (i.e. levels of parts).

NHLI/NHLBI provided the funds to invite approximately 30 senior scientists who represented both the biomedical and behavioral/social sciences to the Yale Conference. One of the first tasks of the conferees was to name this field. After considerable discussion, the term "behavioral medicine" was adopted (you either loved it or hated it, but wouldn't forget it), so we could now complete the title of the meeting: the *Yale Conference on Behavioral Medicine.*

The second task of the delegates was to make an initial effort to define "behavioral medicine". After two days of discussion (and one of New Haven's biggest snowstorms in its history), the conferees felt they had successfully differentiated "behavioral medicine" from its forbearer "psychosomatic medicine", emphasizing the empirical basis of behavioral medicine constructs in developing more effective clinical practices as compared with the psychodynamic theoretical orientation of psychosomatic medicine.

Yale Definition: … *the field concerned with the development of behavioral science knowledge and techniques relevant to the understanding of physical health and illness, and the application of this knowledge and these techniques to prevention, diagnosis, treatment and rehabilitation. Psychosis, neurosis and substance abuse are included only insofar as they contribute to physical disorders as an endpoint* (Schwartz & Weiss, 1978a).

However, after 6 months of "testing" the definition, it became obvious that additional attention needed to be paid to how the biomedical and behavioral scientists could blend their knowledge and skills to establish a synergy of ideas and approaches which could not be attained by one discipline alone (the classic 1 + 1 = 3 emergent effect at the heart of systems theory). The conference proceedings were published as a 50 page document and distributed by NIH [DHEW Publication No (NIH) 78-1424, 1978] through its extensive mailing list. A summary of the proceedings was invited by the Editor (Doyle Gentry) and published in the first issue of the Journal of Behavioral Medicine (Schwartz and Weiss, 1, (1), 3–12, 1978a).

Post Yale

Institute of Medicine/National Academy of Sciences

A second meeting was hosted in 1978 by the Institute of Medicine/National Academy of Sciences, courtesy of Dr. David Hamburg, President of the IOM, to assist in (1) redefining "behavioral medicine" and (2) establishing the necessary organizational structures that would provide a credible resource of senior scientific advisors representing this emerging area of science to the NIH and other Federal funding agencies as well as being a scientific and professional "umbrella" for us to exchange ideas, nurture newcomers to the field, collaborate on projects and stimulate the growth and content of behavioral medicine.

IOM/NAS Definition:…… *the interdisciplinary field concerned with the development and integration of behavioral and biomedical science knowledge and techniques relevant to health and illness and the application of this knowledge and these techniques to prevention, etiology, diagnosis, treatment and rehabilitation.***(**Schwartz & Weiss, 1978b) **[N.B.: "psychosocial" was added by the ISBM in 1990]**.

Two organizations were formed following this meeting (Weiss, 1980)

(1) **The Society of Behavioral Medicine** (SBM) would be the principal membership organization representing professional, scientific and educational components of the field. Yearly conventions would highlight the contributions of behavioral medicine science and practice to prevention and control of disease. Current membership ~ 2400.

2) **The Academy of Behavioral Medicine Research** (ABMR) would be an invitation-only group of senior scientists dedicated to establishing the "gold standard"

for biobehavioral research. Current membership ~ 250.

Both organizations would establish collaborative relationships with NIH to showcase the accomplishments of behavioral medicine science and practice and to serve on committees, review groups and as consultants to assist NIH in its efforts to support the highest quality of biobehavioral science.

International Society of Behavioral Medicine (ISBM)

In 1986, representatives from several national societies of behavioral medicine met to discuss the formation of an international society of behavioral medicine to promote the creation of national societies as well as to support international collaborations among like-minded scientists, practitioners and educators. It was decided that ISBM would be dedicated to the development and support of national and regional societies and would be a federation of national and regional societies rather than individual membership. (Weiss, 1992a, b, c). The first international congress took place in Uppsala, Sweden in 1990. Current membership constitutes 26 national and regional societies.

So……what else was needed to "legitimize" this new field? With the field of behavioral medicine beginning to achieve a foothold in the health "establishment" through the contributions of established scientists, two additional issues required attention:

(1) Means to share scientific contributions with like-minded researchers and clinicians, i.e., creation of scientific journals. The Journal of Behavioral Medicine was the first publication to represent the field [3], followed by Annals of Behavioral Medicine, the International Journal of Behavioral Medicine and, most recently, Translational Behavioral Medicine.
(2) Resources to educate future scientists and clinicians by offering training programs at major institutions (Weiss, 1978b). Over the 5 years following the Yale Conference, the number of institutional behavioral medicine training grants (T32s) from NHLBI rose from 1 to 14. Additional training grants were awarded by NIMH and NCI among others.

Translational Behavioral Medicine: the need for "dissemination and Implementation" research has been strongly endorsed by NIH through conferences, RFAs and other FOAs. The need to provide innovative research designs to improve translation of research into practice has clear and important implications for biobehavioral research. Translating scientific findings into clinical practice and health policy requires recipient behavior change associated with the introduction of new technologies and concepts. Finally, the value of adopting new innovations also depends on their sustainability over time, another area familiar to those of us who have studied "adherence to medical regimen" issues.

Working conferences

I would do an injustice to the distinguished scientists who participated in the NHLBI Working Conferences during my 19-year tenure at NHLBI without paying homage to their stellar contributions to the success of the behavioral medicine program. I introduced the concept of the "Working Conference," as a mechanism to bring maximum exposure to key areas of underserved biobehavioral science, with the objective of determining how to correct the identified deficiencies in our state of knowledge. These 3-day yearly gatherings were typically held in comfortable, yet remote sites (before cell phones). Invitees were able to uninterruptedly participate in one of perhaps 6–8 small working groups designed to identify the state of the science in a given area, and to prepare detailed reports highlighting what would be necessary to generate progress in resolving the problems so identified. Over a period of 16 years, hundreds of senior scientists (including one Assistant Secretary for Health and several Institute Directors) typically worked from morning into the wee hours, providing invaluable program recommendations to us, many of which were transformed into RFAs for the extramural scientific community. All proceedings from these meetings were published in either soft or hard cover volumes, conference proceedings (monographs) or journal Special Issues (e.g., Blumenthal, Matthews & Weiss, 1994; Schwartz et al. 1979; Shapiro, Jacob & Weiss, 1986; Shapiro et al. 1978; Weiss, Cooper, & Detre, 1981).

True to my promise of back-channel sharing, the Working Conferences typically provided many more recommendations than we could fund. However, I would prepare at least six or 7 draft RFAs for our Director's approval (N.B.: approval did not mean funding). He was always amused that I brought so many proposed initiatives for approval when each Branch was only given funding for one, in rare instances two per year. His approval was necessary, however, to keep the initiatives alive. This meeting would occur in the Spring. One initiative was prepared for release; the others were in my back pocket….until August. Now our budget people were busy trying to be sure all funds allocated to NHLBI were committed by September 30. The phone call would come in mid-August, about 6 weeks remaining in the fiscal year. It would be budget staff, discovering little pockets of unspent money. The question was "Do I have any approved ini-

tiatives in the $X,XXX,XXX range?" No problem. Of course. What else do you need? I usually could get two, perhaps three initiatives funded, depending on the surplus "end of year" monies. Not one of the other Branch Chiefs ever figured that out….and I never told them either.

Future

Technological advances in so many fields related to behavioral medicine suggest a bright future for those who have tied their dreams to the behavioral medicine wagon. I believe the next 40 years will be equally or even more exciting, given that we have only begun to scratch the surface of our new technological capabilities. Unfortunately, it is unlikely that I'll be around to share that next chapter, although I have found an antidote for aging. It's simple: at age 65, you begin counting backward, as I did. So I just celebrated my 49th birthday. That wasn't so hard, was it? If I could only as easily convince Father Time…

If Steve just celebrated his 49th birthday, then using his time reversal formula, I have just turned 56. For us to look to the potential future of behavioral medicine, it is valuable to briefly review the evolution of technologies and tools that initially stimulated—and continue to inspire—the advancement of behavioral medicine theory, research, and applications. If anything points to the continued evolution of behavioral medicine, broadly defined, it is the incredible transformation of technology that has led up to and followed the Yale Conference on Behavioral Medicine.

Some of us have had the opportunity to experience this firsthand. For example, my first grant-supported computer at Harvard University in 1973 was a PDP 11 GT40 computer system and it cost $40,000 (or approximately 275,000 in 2018 dollars). It came standard with a tiny (by today's standards) 16 K of RAM memory. I purchased an extra 8 K of memory—which was the size of a suitcase—for an additional $5,000. The computer took up a whole room, and had to be maintained at 60 degrees. The price did not include a hard drive (which in those days was smaller than 100 K).

By contrast, today my laboratory at the University of Arizona collects data using portable laptops with 16 gigabytes of RAM and literally tetrabytes of hard drive storage. The laptops can run EEG telemetry equipment connected via Bluetooth and display the data on large (e.g., 60 inch) high definition color monitors. The processors run at gigabyte speeds and store data in the cloud. They cost less than $1500.

Moreover, I can even display data on my iPhone (or iPad) which have 64 gigabytes of storage, and I just purchased an Apple 3 digital watch that not only connects to my iPhone but it directly connects to the 4G network as well. Finally, in contrast to the miniscule 8 K of memory (the size of suitcase) that I purchased for $5000 (which would be almost 30,000 in 2018 dollars), I currently carry 64 gigabytes of memory (smaller than my thumb) that I purchased for $50!

Today's children have computerized devices and toys of all shapes and sizes, including AI robots and even smart dolls. They take for granted that they can connect with people all over the world via their smartphones. They take for granted that they use these intelligent devices to track their exercise and food intake, remind them to stretch and breathe, provide them with relaxation and meditation instructions and music, and even monitor their heart rate and heart rate variability. They expect that this technology will advance so that not only can they watch whatever movies and documentaries they want, whenever they want, but that this technology will continue to evolve and enable them to connect with their bodies (physiology, biochemistry, genetics), with each other, and with their health care providers, all effortlessly. The biobehavioral science opportunities of all this technology is nothing short of staggering.

To approach such ever expanding behavioral opportunities, it is valuable to recall the four conceptual levels of meanings of "behavioral" in behavioral medicine considered 40 years ago. To minimize the reader's yawning time, I state the four levels ultra-simply (see Schwartz, 1982):

> Level I: Behavioral means "behavioral therapy" concepts and techniques applied to medicine and health. For example, behavioral medicine was stimulated, in part, by important advances in operant conditioning of automatic responses (e.g., Schwartz, Shapiro & Tursky, 1971) and the emergence of biofeedback theory, research and applications (e.g., Schwartz, 1972; Schwartz & Beatty, 1977).
> Level II: Behavioral means "psychological" concepts and techniques applied to medicine and health. Here, behavioral concepts and techniques are a subset of psychological concepts and techniques. The emergence of positive psychology, including psychological factors of optimism and techniques like meditation, fall within Level II. The creation of the Health Psychology division within the American Psychological Association (Steve and I both served as early Presidents of Division 38) falls within Level 2 and extends to Level III.
> Level III: Behavioral means "behavioral and social" sciences, broadly defined, and this definition includes social psychology, sociology, and anthropology. Here, psychological concepts and techniques are a subset of "behavioral and social" concepts and techniques—i.e. biopsychosocial and social psy-

chophysiology. Level III includes concepts such as social support, and factors such as religion and spirituality. This was the level adopted at the Yale Conference.

Level IV: Behavioral means "functional" sciences—i.e. understanding common principles that apply to the behavior/functioning of all systems at all levels. During the era of the Yale Conference, interdisciplinary scholars spanning physics and engineering to ecology and astrophysics, were formulating general systems theory, including living systems theory. Level IV extends biopsychosocial to the physical/chemical levels at the micro level (e.g., psychoneuroimmunology) and psychosocial influences on gene expression, and spiritual/existential at the macro level (e.g., double blind studies on the nonlocal effects of prayer and distant intentionality on healing and health). Level IV conceptualizations may also provide a portal to extending our efforts to "populations" through expanding our partnership with the field of public health. Not surprisingly, Level IV theories and applications includes the most challenging and controversial frontiers in the potential future evolution of behavioral medicine.

Whereas psychosomatic medicine originally arose in the biomedical sciences (and was initially developed primarily by MDs), psychophysiology originally arose in the behavioral (Level II) and engineering sciences (and was initially developed by PhDs and engineers). Developments in technologies and tools inspired brave—some said foolish—scientists and clinicians to challenge what was then generally assumed to be "impossible."

For example, in the 1960s it was generally assumed that the voluntary control of autonomic responses was impossible. By the 1970s and 80s, we were discovering that this assumption was incorrect.

Meanwhile, in the 1970s, it was generally assumed that it was impossible that psychological processes could influence cellular and chemical processes. By the 1980s and 90s, we were discovering that this assumption was incorrect (e.g., psychoneuroendocrinology).

Meanwhile, in the 1980s it was generally assumed that it was impossible for the mind to affect genetic functioning. By the 1990s and the first decade in 2000, we were discovering that this assumption was incorrect (e.g., emerging epigenetics research).

And meanwhile, in the 1990s—and continuing to the present—most western scientists assume that it is impossible for the mind to influence physical systems, including quantum processes. And yet, the past two decades of research in what is sometimes termed parapsychology is revealing that consciousness and intention can alter the behavior of photons in the double-slit experiment under double-blinded conditions. And these experiments can be conducted over the internet, long distance (e.g., Radin, Michel, & Delorme, 2016).

If there is one lesson that I have learned over the years (both preceding and following the Yale Conference), it is to keep an open mind and follow the scientific evidence where it takes us. Though young scientists and students today may find it hard to believe, prior to the Yale Conference, there was overt animosity between conventional biomedical and behavioral scientists. One of the unique qualities of the Yale Conference was the bringing together of behaviorally oriented biomedical scientists (MDs) with biomedically oriented behavioral scientists (PhDs) for the purpose of forging a productive synergy of the two.

It is worth noting that the emergence and evolution of behavioral medicine set the stage for the emergence and evolution of integrative medicine (which incorporates behavioral medicine/mind–body medicine). Given that I began my academic career as an electrical engineering student, and also that my conceptual orientation incorporated Level IV systems thinking, it is probably not surprising that my research career would take me from psychophysiology and conventional behavioral medicine (Levels I–III) to what can be called psychobiophysics and the new fields of energy medicine (including energy psychology; Level IV) (e.g., Baldwin & Schwartz, 2006). Lessons learned in the politics and funding of behavioral medicine helped in the establishment of the Office of Alternative Medicine and its evolution into the National Center for Complementary and Alternative Center (NCCAM; now National Center for Complementary and Integrative Health, MCCIH) in NIH. This made it possible, for example, for me to receive a 4 year Center for Frontier Medicine in Biofield Sciences grant (the title was chosen by NCCAM) (reviewed in Schwartz, 2007). Similarly, the Office of Behavioral and Social Science Research (OBSSR) in the Office of the NIH Director has provided a "portal" for encouraging behavioral medicine research across the entire NIH spectrum.

So where will behavioral medicine be in the next 40 years? Using Steve's formula, if we are still here, he will be 10 years old, and I'll be a teenager. If we take the past 40 year history of behavioral medicine, technology, and science seriously, the next 40 years will be equally transformative, if not more so. And in the process, the conceptual box that currently defines behavioral medicine will get bigger and bigger.

Clearly, both the positive (and negative) consequences of technology for health and illness will be part of the future development of behavioral medicine theory, reach, and practice. However, following Steve's question about

thinking "outside the box," will behavioral medicine expand to incorporate more of the micro levels (e.g., biophysics and quantum physics) and the macro levels (e.g., higher states of mindfulness and awareness)? In the future, will there be new subspecialties of energy behavioral medicine and even spiritual behavioral medicine. As impossible as this may sound, will behavioral medicine eventually consider conducting systematic research addressing claims of spirit assisted healing (e.g., Schwartz, 2012)? As we have reviewed, addressing the assumed impossible is nothing new to behavioral medicine.

I would be remiss if I did not mention that a new global Academy for the Advancement of Postmaterialist Sciences has been created (2017) as a consequence of the 2014 International Summit on Postmaterialist Science, Spirituality, and Society meetings, cosponsored by my colleagues and I at the University of Arizona and Columbia University (the history is reviewed in Schwartz et al. 2017, in press).

Maybe now is a propitious time for behavioral medicine to reconsider its seminal mission and goals in light of such expanding developments and opportunities.

Acknowledgements We would like to thank John Ruiz, PhD, and Alan J. Christensen, PhD, for envisioning our collaborative writing of this retro-prospective essay on the emergence and evolution of behavioral medicine.

Compliance with ethical standards

Conflict of interest Stephen M. Weiss, and Gary E. Schwartz declare that they have no conflict of interest.

Human and animal rights and Informed consent No animal or human studies were carried out by the authors for this article.

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