

Evolution of the Biopsychosocial Model: Prospects and Challenges for Health Psychology

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Although advances have been made in specifying connections between biological, psychological, and social processes, the full potential of the biopsychosocial model for health psychology remains untapped. In this article, 4 areas that need to be addressed to ensure the continued evolution of the biopsychosocial model are identified and a series of recommendations concerning initiatives directed at research, training, practice and intervention, and policy are delineated. These recommendations emphasize the need to better understand and utilize linkages among biological, psychological, social, and macrocultural variables. Activities that facilitate the adoption of a multisystem, multilevel, and multivariate orientation among scientists, practitioners, and policymakers will most effectively lead to the kinds of transdisciplinary contributions envisioned by the biopsychosocial perspective.

Key words: biopsychosocial model, health psychology, behavioral medicine

No scientific field seems to advance without an implicit or explicit set of metatheoretical assumptions. The conceptual base for health psychologists in their roles as researchers, practitioners, and policymakers is the *biopsychosocial model* (Anderson, 1998; Engel, 1977; Kaplan, 1990; Matarazzo, 1980; Schwartz, 1982; Schwartz & Weiss, 1978). This perspective holds to the idea that biological, psychological, and social processes are integrally and interactively involved in physical health and illness. The initially provocative premise that people's psychological experiences and social behaviors are reciprocally related to biological processes has fueled dramatic advances in health psychology over the past 25 years. Moreover, the premise that these subsystems are nested and inextricably connected has stimulated innovations in the design and implementation in interventions to promote health. As a guiding framework, the biopsychosocial model has proven remarkably successful as it has enabled health psychologists to be at the forefront of efforts to forge a multilevel, multisystems approach to human functioning. However, considerable, perhaps even daunting challenges remain as models are needed that specify the processes that connect the biological, psychological, and social systems.

In this article, we examine what can be done to ensure the continued evolution and refinement of the biopsychosocial model. To this end, we first consider the manner in which the biopsychosocial model has been adopted presently and identify what factors have impeded pursuit of the model's full implications for research, intervention, and practice. In light of these observations, we make a series of recommendations designed to further the specification and utilization of the linkages among biological, psychological, social, and macrocultural variables, with the ultimate aim of enhancing health.

Advances and Current Conditions

In the past three decades, basic and applied research across a range of substantive areas has affirmed the value of the biopsychosocial perspective and demonstrated how biological, psychological, and social processes operate together to affect physical health outcomes (e.g., Baum & Posluszny, 1999; Cohen, 1998; Salovey, Rothman, & Rodin, 1998; Taylor, Repetti, & Seeman, 1997). Stress, social support, and emotions, for example, have been shown to play important roles in the progression and management of cardiac disease and cancer (e.g., Anderson, 2002; Smith & Ruiz, 2002). Explorations into common sense models of health and illness have provided important insights about symptom perception, medical care seeking, and patient adherence (e.g., Leventhal, Leventhal, & Cameron, 2001). Behavioral interventions have demonstrated success in promoting smoking cessation (e.g., Niaura & Abrams, 2002), reducing the stress and adverse consequences of medical procedures (e.g., Suls & Wan, 1989) and facilitating the recovery and adaptation of persons with chronic illness (e.g., Anderson, 2002; Antoni et al., 2000; Blumenthal, Sherwood, Gullette, Georgiades, & Tweedy, 2002). (See the special issue "Behavioral Medicine and Clinical Health Psychology" of the *Journal of Consulting and Clinical Psychology* [Smith, Kendall, & Keefe, 2002] for a set of state-of-the-art reviews.)

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Scientific advances have been complemented by consistent growth in the number of health psychologists in universities and on faculties of medical schools (Rodin & Stone, 1987). Researchers and practitioners, identified with the biopsychosocial perspective, have sustained professional societies, such as Division 38 of the American Psychological Association, the Society of Behavioral Medicine, and the American Psychosomatic Society. In fact, the Health and Behavior Alliance includes 26 professional organizations (comprising over 100,000 members) devoted to health and behavior research. The primary aim of the alliance, fostered by the Center for the Advancement of Health, a nonprofit organization, is to promote greater recognition of how psychological, social, behavioral, and environmental factors affect health and illness and to raise funding priorities and resources for these efforts.

The success of the biopsychosocial approach can also be seen in the substantial growth in governmental support for health-related behavioral and psychological research. Currently, the National Institutes of Health (NIH) funds about \$800 million for research devoted to health and behavior. Moreover, the establishment by the U.S. Congress in 1993 of the Office of Behavioral and Social Sciences Research at the NIH reflects a structural commitment to the importance accorded to the integration of behavioral and biomedical knowledge and the need to facilitate interdisciplinary research between social, behavioral, and biomedical scientists (Anderson, 1998).

To What Extent Has the Medical Establishment Adopted the Biopsychosocial Model?

There are many signs of increased awareness that behavioral, social, and macrolevel factors merit as much attention as biological factors in understanding and addressing the country's and the world's health problems. However, the degree to which the biopsychosocial model has been embraced by the biomedical establishment is unclear. For example, a recent survey of U.S. medical schools showed that almost 50% of schools included less than 40 hr of total instruction in psychosomatic medicine and health psychology for medical students (Waldstein, Neumann, Drossman, & Novack, 2001). To the extent that continued advances in specifying the linkages between biological, psychological, and social variables require multidisciplinary teams and access to data from multiple systems, it is essential that not only psychologists but also other health professionals receive training that addresses the importance of specifying these linkages.

As a preliminary assessment of the diffusion and acceptance of the biopsychosocial model, we conducted a Medline search for the term *biopsychosocial* in titles and abstracts of articles in Medline from 1974 through 2001. Medline was chosen because it is one of the largest medical journal abstracting services in the world. To simplify the presentation of the results, we computed totals for each 3-year period (e.g., 1974–1977). Although we recognize that use of the term *biopsychosocial* does not necessarily constitute adoption of the model, explicit reference to the term does reflect, at minimum, recognition of the perspective.

As shown in Figure 1, during 1974–1977, the period when George Engel (1977) introduced the term, *biopsychosocial* was mentioned in six articles. By 1999–2001, it appeared in 350 publications. A companion term, *biobehavioral* (although men-

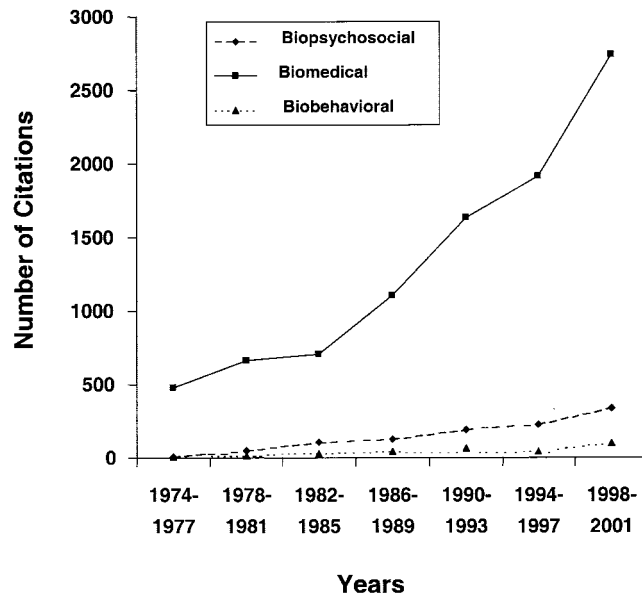


Figure 1. Frequency of citations of *biopsychosocial*, *biobehavioral*, and *biomedical* in Medline.

tioned less on an absolute basis), showed comparable increases across the same time frame. Of course, the increase in citations might only represent the increased presence of behavioral and social science journals in Medline. As a comparison, we tabulated the frequency with which the term *biomedical* was mentioned. In 1974–1977, *biomedical* was used nearly 500 times, increasing to 2,700 times in 1998–2001. Thus, the citation frequency for the term *biomedical* increased by a factor of 5, whereas use of the term *biopsychosocial* increased by a factor of nearly 60. However, when viewed in terms of total number of citations across the 27-year period, *biomedical* was mentioned 9,994 times whereas *biopsychosocial* was only mentioned 1,094 times, a 9:1 ratio. Hence, despite the accelerating rate with which the biopsychosocial model was acknowledged, the biomedical perspective remains dominant, at least by this rough index.

A second way to assess the degree to which behavioral approaches have been integrated into medical science and practice was to tabulate the frequency with which the term *behavior* appeared in four major medical journals—*New England Journal of Medicine*, *Lancet*, *Journal of the American Medical Association*, and the *Annals of Internal Medicine*—from 1974 to 2001. Figure 2 indicates that *behavior* was mentioned in the titles or abstracts of 61 articles during the earliest period and a little over 100 times in 1998–2001; that is, mentions of *behavior* nearly doubled. Although this increase substantially exceeds the increase in the total number of articles published in the four journals during this time period (from 23,829 to 24,375, an increase of 3%), it must be placed in perspective: *Behavior* was mentioned in .002% of the articles in the early years of our survey and only increased to .004% starting in 1986–1989.

Although these indicators of adoption are admittedly imprecise, the terms *biopsychosocial* and *behavior* are mentioned more frequently in the medical literature than they were nearly 30 years

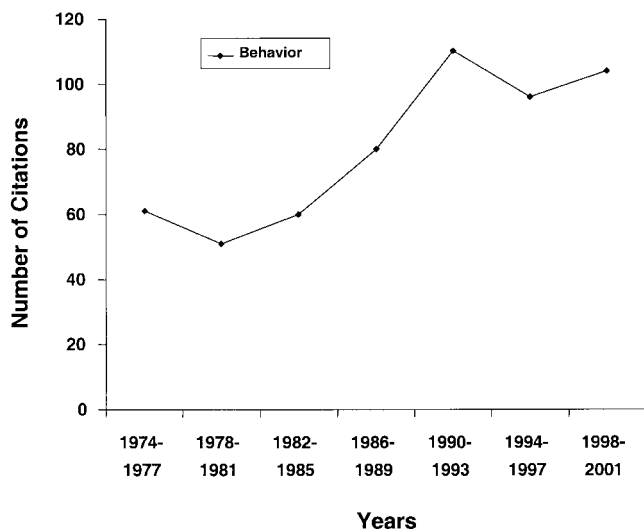


Figure 2. Frequency of citations of behavior in *New England Journal of Medicine*, *Lancet*, *Journal of the American Medical Association*, and *Annals of Internal Medicine*.

ago. They still, however, constitute a small proportion of the absolute number. Social and behavioral researchers and clinicians continue to devote increasingly more attention to physical health, but it is readily apparent that there remains room to improve their standing and visibility within the medical community. In a later section, we return to this issue and provide some recommendations about how to facilitate the development and diffusion of the biopsychosocial perspective.

How Well Do Health Psychologists Practice the Biopsychosocial Model?

At the heart of the biopsychosocial model is the premise that physical health and well-being are shaped by the interactions between biological, psychological, and social factors. How well do health psychologists embrace and examine the multiple systems that underlie the biopsychosocial model? One way to examine this question is to ascertain how often researchers measure all four classes of variables (i.e., biological, psychological, social, and macro [cultural, socioeconomic status, ethnicity]). The assessment of indicators across multiple systems represents the minimum condition for specifying linkages between biological, psychological, and social factors. We independently read and coded all of the studies published in *Health Psychology* over a 12-month period (November 2001–September 2002). Table 1 shows the frequencies with which the four classes of variables were measured. Of no surprise, given the disciplinary focus of the journal, approximately 94% of the studies assessed psychological variables. Social factors, which predominately involved self-report measures of social support and marital satisfaction, were included in about one half of the studies. Biological variables, including physiological reactivity, disease markers based on chart review, and mortality, were similarly assessed in half of the studies. Assessment of macrovariables, such as ethnicity, income and age, were considered sufficient only if investigators measured at least age, gender, ethnicity,

and education or income. A total of 56% of the studies met this criteria.

Although psychological variables received almost uniform attention, the social domain received less coverage. Moreover, assessments of people's social environment tended to focus on their subjective experience of their relationships with friends and family. When researchers reported macrovariables, this information was used only to describe the sample. Biological variables appeared with some frequency, but on closer analysis, it became apparent that they typically referred to a disease used to define the sample.

If investigators hope to delineate the linkages between the multiple systems implicated in the biopsychosocial model, studies need to prioritize the inclusion of a diverse set of indicators. In the present sample of studies, 26% included measures from all four domains (i.e., biological, psychological, social, and macro) and an additional 38% included measures in three of the four domains. A review of these combinations revealed that investigators have tended to focus on the interplay between either psychological and social factors or psychological and biological factors. Hence, opportunities to explore the interconnections between biological and social factors appear to have been limited. In fact, if anything, these data afford an optimistic estimate of the effort investigators have put into specifying the interconnections between classes of variables. Too often, even though indicators were assessed across multiple systems, the relations between those systems were not tested, or, at least, not reported. In sum, researchers have taken the basic tenets of the biopsychosocial model seriously, but more could be done to pursue the linkages among subsystems.

Places for Growth

The biopsychosocial model is best viewed as a "work in progress." In this vein, five issues are identified that, if addressed, should facilitate the growth of this approach.

First, for the biopsychosocial perspective to be fully embraced, investigators need to continue transforming it from a conceptual framework into a model that specifies the linkages between the

Table 1
Measurement of Biological, Psychological, Social, and Macrolevel Variables in 70 Studies Published in Health Psychology

Variable	Frequency	%
Biological	39	55.7
Psychological	66	94.3
Social	37	52.9
Macro	39	55.7

Note. The biological category included physiological reactivity, immune function, medical chart diagnosis, mortality, and physiological indices (e.g., cotinine for nicotine ingestion). The psychological category included measurement of affective, cognitive, and behavioral variables. The social category included measurement of social support, relationship satisfaction, and social network size. Macro variables involved representation or measurement of at least four of the following: age, gender, ethnicity, income, and education. The two coders disagreed in only 5% of judgments; disagreements were settled in discussion.

different subsystems. This emphasis was cogently articulated by Gary Schwartz in 1982:

To the extent that the biopsychosocial approach more effectively stimulates *common* theories and research designs, facilitates *interdisciplinary* thinking and research, and encourages greater *synthesis* among *numerous* variables, it has the potential to establish a more effective, multicause, multieffect approach to health and illness. (p. 1049)

Using health promotion as an illustration, the nested nature of psychological, social, and biological subsystems forces questions about the feasibility of simple strategies as “magic bullets” for change and maintenance of behavior change (McKinlay, 1993; for a review, see Orleans, 2000). Although some interventions can elicit impressive rates of initial changes in behavior, rates of long-term maintenance have been less substantial (e.g., Kumanyika et al., 2000; Ockene et al., 2000). One reason may be that the factors that enable people to adopt a new pattern of behavior need not be the same ones that sustain that behavior over time (Rothman, 2000). Appreciation of biological, social, and psychological inputs from different levels encourages the recognition that cessation and maintenance are the result of different processes and variables in combination that unfold over time (Anderson, 1998; Leventhal et al., 2001; Prochaska & DiClemente, 1983).

We think it is essential to capture the complexity of the cascade of processes that contribute to illness etiology; prevention and treatment; and development of a multisystem, multilevel, multivariate orientation. Such a perspective leads to the recognition that multiple systems contribute to the etiology and progression of disease. A good case in point would be the recent recognition that inflammatory processes play as much a role in atherosclerosis (Black & Garbutt, 2002; Ross, 1999) as autonomic and hemodynamic factors (Matthews et al., 1986). Linkages, however, must be made not only within but also across levels of analysis and systems. For example, exposure and appraisal of stress may vary as a function of personality (individual psychology), socialization (psychological and social), and cultural and socioeconomic factors. Further, if multiple influences are impinging on the organism, then multivariate statistical approaches are required to model these influences adequately. There are encouraging signs of a fuller appreciation of the multiple system, multilevel, and multivariate nature of the questions for health research, promotion, and treatment, but the field has a considerable way to go. As the reader will note, several of the issues described below are connected to the question of how well health psychologists can sustain the multiple system, multilevel, and multivariate (“3 M’s”) vision.

Second, health psychologists need to recognize that relevant constructs can serve multiple roles within a theoretical model. For example, funding agencies have strongly encouraged investigators to factor in culture and ethnicity for purposes of generalizability. Yet, diversity and culture are likely to have far-flung influences that cross levels of analysis (Eisler & Hersen, 2000; Johnson et al., 1995). If particular groups have distinctive experiences (e.g., types of stressors), then merely adjusting for ethnicity statistically and treating stressors as if “one size fits all” is likely to produce a misleading picture because diversity also may be associated with different coping styles, economic resources, and illness exposure. There have been noteworthy advances in obtaining representative samples with respect to gender and ethnicity in recent years, but a

comprehensive broadening requires sustained effort. Furthermore, theoretical models are needed to help determine whether sociodemographic factors, such as race or ethnicity, will matter for particular health outcomes. The efforts of health psychologists would be more productive and more efficient if they were grounded in theory-based predictions as to when and why an intervention will operate differently when directed toward a specific social group (e.g., Latinos) or in a specific setting (e.g., churches).

Third, if the foundations of health and illness and prevention and treatment involve complex interacting systems then rich data sets are required. This means collecting information that assesses the organism at all relevant levels and, where appropriate, tracking phenomena over time—no small challenge. It also means that researchers, practitioners, and policymakers should be more receptive to physiological, self-report, and sociological data. Fortunately, different segments of health psychology do make use of these resources, but it remains rare to find all of these indicators in the same study.

Fourth, a very challenging prescription is to not let need for precision or explanation impede growth of potentially important outcomes. The canons of the scientific method require careful operationalizations and the experimental method. One (sometimes) undesirable consequence of psychology adopting the physical sciences as a model is premature attempts at hypothesis testing and explanation. Hypothesis testing is appropriate for well-developed theories and documented phenomena, but first there needs to be a phenomenon (or effective treatment outcome) worth explaining (Rozin, 2001). Many areas of health psychology remain at a stage where discovery needs more recognition than explanation. In addition, the serendipitous intervention outcome, even if lacking a sound theoretical reason, may be a worthy object of study. Prepared minds are needed to capitalize on serendipitous findings, and to be prepared, individuals must be conversant with and appreciative of the interplay of biological, psychological, and social factors.

Fifth, and finally, there is a general need for better translation from research to practice and policy and from policy and practice to research (e.g., Keefe, Buffington, Studts, & Rumble, 2002). Often important research findings with implications for practice remain in the literature and are not implemented. By the same token, researchers often do not know how their results and recommendations have fared in actual practice and as a consequence cannot gauge the generalizability of the results or coverage of the theory. Policymakers need to not only appreciate and weigh the implications of theoretical models for their decisions but also inform the research community when policy issues arise that available theories are unable to address. These problems probably apply less to health psychology than to more conventional academic subdisciplines, but gaps still exist. Means by which researchers, practitioners, and policymakers can more easily converse need to be developed.

Recommendations

We offer several recommendations for initiatives involving research, training, practice, and policy that we believe will help to move the discipline forward with respect to the five areas identified as needing growth.

Research

Because health behaviors and health outcomes represent the result of interacting biological, psychological, and social processes, researchers should incorporate such variables in their research and appreciate that reciprocal influences, feedback loops, and correlated variables are the rule not the exception. In short, health psychologists need to design research that embraces rather than shies away from the complexity of the phenomena of interest. To that end, the methodologies used must permit appropriate tests of hypotheses. For example, we should resist reliance on cross-sectional designs to assess models of how phenomena unfold over time. Any single study, of course, should not be expected to accomplish all of this, but researchers should think about these issues as they formulate their research.

This also means, when possible, using multiple indicators to obtain data from multiple systems. The problems associated with global self-reports have been amply demonstrated (Stone et al., 2000), but fortunately, the recent revolution in ambulatory monitoring and in situ assessment, among other technologies, offers some solutions (Schiffman & Stone, 1998). These techniques offer opportunities to capture more fully the inherent complexities of the systems with which we as health psychologists are most concerned. However, as these techniques become more sophisticated, the need and expansion of transdisciplinary teams becomes greater because no single researcher can master all of these domains. We use the term *transdisciplinary*, rather than *cross-disciplinary*, to refer to efforts that do more than merely cross disciplinary lines but create new disciplines. The development of the field of psychoneuroimmunology is an excellent example of a field developing from transdisciplinary activity (Ader & Cohen, 1975; Kiecolt-Glaser & Glaser, 2002).

With the continued growth in the applications of health psychology, it is important to not lose sight of the fact that the theoretical models rest on a foundation of principles identified by research programs that are situated mainly in the laboratory rather than the field (Schneiderman, 1987). The interdependence between basic and applied science must continue to be recognized and affirmed. To this end, when investigators choose to focus on a particular class of variables, they need to acknowledge that they are “cutting the pie” into slices. By explicitly recognizing the limitations of their own work, future researchers will be better able to identify areas needing extension.

Training

Consistent with recommendations of the National Working Conference on Education and Training in Health Psychology (1983), course work in substantive areas, research design, and data analysis are important components of doctoral training in health psychology. However, this curriculum can only create partial appreciation for the shifting interplay of different forces that shape health and illness. Health psychology practicum, including supervised experiences (not merely contact hours) in medical settings or community environments, also should be offered to provide first-hand experience with patients, the operations and policies of medical settings, and contact with physicians and other health professionals. It would seem that clinical practicum experiences especially geared to health psychology remain rare. Without in

vivo training, the aspiring health psychologist will lack vital information about specifics of disease, experience in collaboration and communication with medical professionals and patients, and knowledge of the practical realities of conducting research or interventions in applied settings. Of course, the specific context for these practicum experiences will depend on the needs of the trainees. For students who are focusing on prevention (e.g., recreational drug use and unprotected sex), practicum experience might mean doing fieldwork in neighborhoods with social anthropologists or social workers. The point is that special curricula that provide health psychology practicum experience should be a first-order priority for all graduate programs.

Health psychologists often collaborate with a diverse array of individuals within their field (e.g., clinical psychologists, social psychologists, psychophysicists) as well as with professionals from other fields (e.g., physicians, nurses, allied health professionals, statisticians). Managing a successful intra- or interdisciplinary collaboration is fraught with challenges. For example, the process by which one contacts and forms a collaborative relationship involves the acquisition of skills to facilitate interaction and avoid turf battles. Only a few existing pre- or postdoctoral programs provide the necessary training to facilitate the development of healthy, productive collaborations. How to make contacts and communicate what the health psychologist can provide to health care professionals that is distinctive should be developed as a curriculum topic. Also, it is important to define how credit and funding can be appropriately negotiated in interdisciplinary teams where the rewards of research and treatment differ for different parties.

Some comments should also be made about financial support for training. In 1999, the Center for the Advancement of Health published *Cultivating Capacity* (1999), a report concerning the level of support provided by the NIH for research training in health-related behavioral and social sciences. Only \$64 million, or 9.7% of all the NIH training spending, was devoted to behavioral and social science training. Fortunately, most NIH institutes report an interest in increasing applicant numbers in this area, but this is not the case for all NIH institutes. In light of documented evidence for the role of behavioral and social factors in the onset, progression, and management of many diseases, we think an expanded force of health-focused behavioral and social scientists is needed. Additional support for the costs of training should be an important priority.

Finally, with regard to training, the development of continuing education opportunities, such as summer institutes that provide pre- and postdoctoral scholars with information about new developments in medicine, biology, and psychology, seems essential. This is especially important if health psychologists are to “embrace the complexity.”

Policy and Funding

In many settings, complexity is considered a vice. However, the biopsychosocial model demands that complexity be viewed as a virtue, albeit a challenging one. Funding agencies and review panels prefer impeccable methodologies and nonmessy samples. The appreciation that new problem areas inevitably are messy needs greater recognition by review panels and policymakers. Some granting institutions have special programs specifically tar-

getting innovative, high-risk directions, especially by young investigators. Such initiatives should be encouraged.

Policymakers also should recognize that the science and practice of health psychology is an evolving enterprise, and to that end, more attention must be devoted to professional development both at the pre- and postdoctoral levels. Exposure to the most recent advances in medical science, technology, and health care cannot be assumed to be picked-up in the health psychologist's spare time. The development of special transdisciplinary curricula and practicum experiences needs financial support. In addition, policymakers should create ways to educate other disciplines about what health psychology can bring to the table.

Finally, the biopsychosocial model forces recognition that transdisciplinary collaboration is the sine qua non of health psychology. Administrators should reward rather than punish collaboration. The traditional model in academic settings is the "lone ranger model," in which the individual researcher blazes new territory. (This is less the case in medical schools and schools of public health.) In health psychology, lone rangers seem certain to fail because collaboration among psychologists and other health professionals is essential to the enterprise. Administrators will need to adjust their procedures of evaluation to recognize that multiple investigators and shared credit are the rule in health psychology, not the exception.

Practice

Too often, the findings and implications of basic research do not make their way to clinical practice and intervention. This can be as much the fault of researchers as clinicians. In the interests of creating tight designs and precise measures, researchers can create manipulations and measures that fall far short of what is practical and implementable in clinics or in health promotion campaigns. This problem is potentially avoided when the researcher is also a clinician. However, in certain types of basic research, this will not be the case. In such instances, a desirable strategy would be to involve experienced clinicians at the start of the research enterprise and in more than a consultant role.

It is our impression that many basic and applied research findings are not making their way to the clinicians that might put them to use. This is not too surprising, as advances often rely on basic science research that was not intended to have clinical applications (Miller, 1987). Ways need to be found to translate research findings in the journals into implications and recommendations for practitioners in professional settings. One possible strategy is to solicit special articles that synthesize research results. The recent emphasis on reviews of evidence-based treatment (adopted by the *Annals of Behavioral Medicine* and *Health Psychology*) represents one avenue. However, it is well known that practitioners have many demands on their time, which prevent them from keeping up with the latest developments in research. Alternate routes should be found to distribute research findings to practitioners. Equally important is to find ways to communicate the success and failures of practitioner-led initiatives to researchers. In fact, the implementation of treatment paradigms in professional settings often offers a unique opportunity to examine the intervention effect across populations, modes of presentation, and health issues. In general, strategies need to be found to increase communication back and

forth between researchers and practitioners. Perhaps the Internet provides one route to nurture this kind of communication.

The ultimate test of the biopsychosocial model in clinical practice is whether it leads to better health outcomes than the traditional biomedical model. As noted by Schwartz (1982), the biopsychosocial model asserts that a medical diagnosis that considers the interaction of biological, psychological, and social factors should lead to improved diagnosis and better predictions about treatment and follow-up. Another premise is that interventions involving biological, psychological, and social elements should do better than treatments grounded on any single class of variables. Both of these premises are amenable to empirical test. Relevant research has accumulated in the two decades since Schwartz articulated these challenges, however, the field is far from presenting definitive evidence. (See Kaplan & Groessl, 2002, for a related discussion regarding the cost-effectiveness of behavioral medicine services.)

Conclusion

In this article, we described some of the strides made in health psychology and with the biopsychosocial model. However, the full potential of the biopsychosocial perspective and, in particular, the ability to advance theory and practice through its use remain untapped. Continuing success in health psychology depends on a strong commitment to the biopsychosocial model and its implications. This means emphasis on transdisciplinary collaboration; striving for theoretical and research developments that cultivate the multilevel, multisystem, and multivariate nature of health processes; and the development of curriculum and funding policies for the next generation of researchers and practitioners that recognize the complexity of the enterprise.

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