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Behavioral Medicine and the Health of Our Nation: Accelerating Our Impact

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Abstract

A key goal of this paper is to illustrate the impact of behavioral medicine on the factors that influence population health. A second goal is to consider the delicate balance between relevance and excellence as we bring our science to bear on important social and public health problems. If we are to increase the translation of our evidence and accelerate our impact, we must increase our relevance while maintaining excellence in our scientific methods. What are the pressing questions facing those that we would like to use our work, and how we can increase our relevance to theirs? We must work on the marriage of relevance and excellence—use rigorous methodologies, but be flexible in our approach, using study designs and methods that will get rapid yet rigorous answers to the questions that are facing practice and policy settings. We have the tools and the knowledge to impact the health of our nation.

Introduction

In terms of the history of science, behavioral medicine is a very new field, just over three decades old. This is particularly notable when one considers the many contributions made by behavioral medicine researchers and practitioners. As is typical of most fields as they emerge, an extensive focus was initially placed on establishing the field's credibility and gaining acceptance. However, it is important to occasionally take a step back and focus on the field as a whole—its contributions and impact, as well as its continued potential to influence the health of our nation.

This paper has two goals. The first goal is to illustrate the impact that behavioral medicine has had on our understanding of the factors that influence population health. A brief review of behavioral medicine's short history is a good reminder of the large and continually growing body of evidence that has accumulated. However, it is important for our field to also consider how to accelerate its relevance to both practice and health-related policy, while at the same time maintaining our tradition of excellence. The second goal of this paper is to consider this delicate balance between relevance and excellence as we bring our science to

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bear on important social and public health problems. I will argue that relevance is key to successful translation of our evidence base in ways that can influence population health.

A Rapid Trajectory

The field of behavioral medicine, and its' premier society, the Society of Behavioral Medicine, were established in the 1970's. Although the history of behavioral medicine has been recently reviewed (1, 2), it is worth noting the very rapid pace at which evidence supporting the development of the field accumulated. In 1982, the Institute of Medicine report entitled "*Health & Behavior: Frontiers of Research in the Biobehavioral Sciences*" (3) identified and integrated a range of research and identified promising areas, or "scientific opportunities," for future development. This report noted the importance of both behavioral and social factors on health and health outcomes. For example, it recognized that both access to health care and regard for its advice are behaviorally influenced, and that the burden of illness is closely related to social, psychological, and behavioral aspects of the way of life of the population. This report signaled movement away from a "tell them and they will change" approach, and focused attention on systematic research targeting improvement of preventable risk factors, creating unprecedented research opportunities that changed the way that the health care community and the public at large thought about health. This report highlighted the importance of combining the rich and deep traditions of the human condition that came from the behavioral sciences, with the opportunity to influence health.

Over the next two decades, there were several additional reports acknowledging the key role played by behavioral medicine (1). Three seminal IOM reports in 2001 illustrated just how far the field had come. For example, "*Promoting Health: Intervention Strategies from Social and Behavioral Research*" (4) concluded that behavioral medicine had met the challenge of developing effective clinical interventions, and now attention was needed on multiple levels of influence. This report highlighted the need to move beyond health decision-making by individuals and providers, and to begin to look at the environment in which those decisions are made as key intervention targets themselves. "*Health and Behavior: The Interplay of Biological, Behavioral, and Societal Influences*" (5) also acknowledged that biological, behavioral, and social factors interact through multiple feedback mechanisms to influence individual health over time. This report concluded that health is not defined solely in biological terms, but also is a function of psychological and social variables; many events traditionally considered irrelevant actually are quite important for the health status of individuals and populations. "*Crossing the Quality Chasm*" (6) shifted the focus of practice improvement interventions from educating physicians to a focus on the health care system itself. Behavioral medicine began to play a key role in these activities, most notably in work related to re-aligning the health care system to implement smoking cessation practice guidelines and evidence-based screening (1).

Has Behavioral Medicine Science Had Impact?

Despite the acknowledgement of the contributions of behavioral medicine, it is important to consider the extent that these have been predominantly "academic" contributions, or have

indeed had an impact on the health of our nation. I would argue that, although there are certainly some examples of having largely an “academic impact”, there are many other examples of impact on population health. The case of tobacco is an excellent example of how, when the many aspects of behavioral medicine all come together—from our understanding of biology, to our interventions, our consideration of social factors, our work in dissemination, and influence on policy—there is a significant and measurable impact on health outcomes.

Most of us can remember a time when smoking was widespread and there were few, if any, public protections against second-hand smoke exposure. Today, 29 US states, Washington, D.C., Puerto Rico and the U.S. Virgin Islands, plus hundreds of cities and counties, have enacted strong smoke-free laws that include restaurants and bars (7 2011). Over 30 countries world-wide also have smoke-free laws, thanks in large part to the World Health Organization’s (WHO) Framework Convention on Tobacco Control (FCTC) (8), which developed out of the large body of evidence related to tobacco control. Over 170 countries are now parties to the WHO FCTC, illustrating worldwide efforts to disseminate and implement tobacco control science.

Perhaps the best way to illustrate impact in tobacco control, however, is to provide a detailed example of the Massachusetts Tobacco Control Program (MTCP). I have selected this program in part because Massachusetts is my home state, but also because MTCP is one of the few truly comprehensive tobacco control programs in the US. In 1990, before the initiation of MTCP, smoking prevalence in Massachusetts was slightly above the US average—about 24% (9) (see Figure 1). The MTCP began in 1993, and by 2005, the smoking prevalence in Massachusetts was only 18%, considerably below the national average of 20.5%. Even with significant tobacco control activity at the national level and recent down-ward national trends, Massachusetts has experienced excellent progress. However, the overall prevalence rates mask the true picture. Despite the overall declines in smoking prevalence observed by 2005, there continued to be very significant disparities in smoking prevalence, particularly by education (see Figure 2). The rate of decline among those without a college degree was about half of that found among the more educated. In Massachusetts, where two-thirds of adults do not have a college degree, the slower rate of decline among the less educated was a very substantial problem. However, drawing on the scientific evidence base, in 2006 the state Medicaid program, MassHealth, began covering tobacco dependence treatment, including pharmacotherapy, as part of the state’s health care reform effort. In the two years following this decision, seventy thousand MassHealth subscribers used the benefit— or 37% of all Massachusetts Medicaid smokers (10). Over this same period of time, the demographic-adjusted smoking prevalence declined by 26%—in the very population that has historically had a flat prevalence rate (see Figure 3). The reductions in smoking prevalence were associated with significant decreases in the health consequences of tobacco use. After adjustment for other state-level policies, the coverage of tobacco treatment by MassHealth was accompanied by a 46% reduction in the annual rate of admissions for heart attacks and a 49% annualized decline in admissions for coronary atherosclerosis among MassHealth beneficiaries (11). These are very tangible and important health outcomes that result from improved access to effective treatments. When it all comes together—when you have effective treatments, access to those treatments, and policies that

support use of those treatments, it truly can make an impact on health. Tobacco is just one of many examples that could be used to illustrate behavioral medicine's impact. In just 30 years the field of behavioral medicine has been established, and a robust evidence base has developed across a number of areas. Our challenge now is to bring that evidence base to bear on the health of our nation, routinely and systematically.

The Importance of Relevance in Translation of Science to Practice and Policy

It is important to take stock of where we have had successes, and to determine what lessons might help us with translation of our science in other areas. In the case of tobacco, first and foremost we had an evidence base—effective interventions tested in multiple settings (12, 13). Second, that evidence focused on multiple levels of influence—how to address tobacco at the individual level, but also within the health care system and at the population level (14, 15). Third, a wide range of study designs and methods have been important to fully understand the impact of tobacco control, including randomized control trials, qualitative studies, observational studies, and economic modeling studies (16–21). Finally, from the very early days of tobacco control, there were partnerships among scientists, practitioners, and policy-makers. Sometimes these were unlikely partnerships, and sometimes uneasy—but in the end, absolutely necessary for translating our evidence-base into more effective practice and policy. And most importantly, in large part because of all of these other factors, behavioral medicine was *relevant*. Our science was relevant to people who were concerned about their own health and that of their families; relevant to local and federal policy makers who wanted to improve the health of their communities and nations; and relevant to national policy debates because of the development of cost and health outcome data.

So a key challenge, beyond the case of tobacco, becomes how do we accelerate the relevance of our science, and at the same time maintain our tradition of scientific excellence? If we are to truly meet the challenge of having our science impact on population health, then we must balance *relevance* to decision makers, health care providers, and employers, with *excellence* in the strict adherence to the norms of scientific inquiry. There are no doubt tensions between researchers and decision-makers that can impact on translation of scientific knowledge (22). For example, a key priority for researchers is to increase knowledge of all types, while decision makers prioritize usable or actionable knowledge. Researchers tend to be analytic in terms of interpreting findings, often looking to identify gaps in knowledge, whereas decision makers typically adopt a synthetic approach, aiming to determine the best course of action given what is already known. If one is interested in knowledge translation and in increasing translation of science into practice and policy, then these tensions are no doubt familiar.

One way to address these tensions is to consider how our methods affect the balance between excellence and relevance. As the field of behavioral medicine was emerging, it was critically important to use the most scientifically rigorous methods to establish its credibility. Thus, the randomized control trial became our gold standard, and helped us to address some of the most challenging questions facing our field at the time. However, with the accumulation of 30 years of rigorous scientific evidence, we must ask ourselves if this study

design will help us to answer the pressing questions facing us now. As we try to move the field towards a better excellence/relevance balance, we have to come to grips with the kinds of study designs that we use. Randomized control trials, with their long time trajectory and analytic orientation, may not always be necessary to meet the needs of decision makers. There are a wide range of methodologies available (23), and it would benefit our field if we were open to a broader range of methods that would be best suited to the particular scientific question of interest.

Opportunities to Accelerate Our Impact

With the current push on translation of scientific evidence into practice and policy, we have to be front and center. If not, there is tremendous possibility that we will not reach the full potential of translational efforts. As we consider ways in which we can improve the balance between excellence and relevance and thus accelerate the impact of behavioral medicine, we must consider key challenges, or “opportunities” currently facing us. These include an urgent need to accelerate our impact in health disparities, the need to increase our efforts to implement research in real-world settings, the need to engage in comparative effectiveness research, and the need to accelerate our use of interdisciplinary approaches. I will briefly address each of these issues in turn.

Accelerating our Impact on Health Disparities

Health disparities in the US have been intractable (24). Although much of the research focus has been on racial and ethnic disparities, differences in health status by socioeconomic position are actually much greater than those by race and ethnicity (see Figure 4). This pattern illustrates that health follows the social gradient—low income is a major health risk factor. Concerns about health inequities from the social justice perspective are not new. However, recent data suggests that addressing inequalities is also a matter of economic necessity.

LaVeist and colleagues (25) used data from the Medical Expenditure Panel Survey to estimate direct medical costs associated with health inequities between 2003–2006. They first developed a model to estimate health care expenditures for each racial and ethnic group, using each group’s actual health status. They then re-estimated the model assuming that each racial/ethnic group had health status equal to that of the group with the best health status in different gender and age groups. Expenditures included out of pocket and 3rd party payments, inpatient and outpatient care costs, prescription drugs, and other services (e.g. home health care). Excess costs that were associated with health inequalities exceeded \$230 billion in a 3-year period.

The Robert Wood Johnson Foundation recently commissioned an economic analysis to estimate the annual dollar value of gains in health and longevity that would accrue to less educated Americans if they experienced the lower mortality rates found among those with a college education (26). Using data from the National Longitudinal Mortality Study, it was determined that bringing the mortality rates of those with less than a college degree in line with those of college graduates would lead to \$449 billion in gross benefits. Achieving equity in terms of morbidity would lead to \$527 billion in benefits. The dollar value

associated with all of the benefits that would accrue if everyone in the US had the health and longevity of college graduates is *\$1.02 trillion annually*, or the rough equivalent to the 2008 GDP of India, the world's 12th largest economy. These are costs that we simply cannot afford economically, and cannot tolerate from a social justice perspective.

There are many reasons for health disparities, but one that is frequently considered as primary relates to health care access. In 2006, Massachusetts (MA) passed health reform legislation that has become a model for national health reform efforts. The Massachusetts experience offers important examples that we should learn from in our efforts to reduce health disparities nationwide. Like the federal version, Massachusetts health reform was about insurance coverage, not about cost reform. It was designed to provide near-universal insurance coverage through insurance market changes that provided access to a common risk pool for small-group and non-group consumers, and subsidies for low-income people. It also included coverage mandates for both individuals and employers. Massachusetts health reform has had a significant impact on the prevalence of being uninsured, which fell to 3.5% within two years, the lowest rate in over twelve years (27). However, although there were marked decreases in the proportion uninsured in most groups studied (e.g. sex, income, health status, race/ethnicity), there were not significant reductions in uninsurance rates among non-Hispanic blacks. Further, although there were significant reductions in unmet medical needs due to cost for low-income groups, there were no such reductions found among Hispanics and non-Hispanic blacks. These data suggest that even though significant progress has been made, we need much greater understanding of the social and behavioral determinants of health to identify specific cost and access barriers for vulnerable groups that general insurance reforms may not address. This is a key area for behavioral medicine research, and a top priority for our involvement in health care reform.

Conducting Research in Real World Settings

The second place where we can improve our balance between excellence and relevance is by increasing our research in real world settings. Science in general, and behavioral medicine is no exception, has had a razor-sharp focus on internal validity. Although this was important as the field was developing, our relevance is diminished because of the limited attention that has been paid to external validity. There have recently been several papers devoted to this issue, so I will not review the issues in detail here (28–31). However, I would like to provide an illustrative example from my own work that demonstrates our efforts to conduct research in collaboration with community partners that is relevant to real world practice issues. In an on-going study, we are working with a very large safety net community health center (CHC) system that was concerned about how best to provide case management for cancer screening, and how to more effectively integrate screening targets. Although patient navigation and case management models typically focus on specific cancer screening topics (e.g. breast cancer screening navigation), through our collaboration we began to realize that it would likely be more practical and sustainable to focus the CHC's limited resources on all screenings that a patient needed, rather than on targeting all patients for a particular screening test.(32)

Another pressing concern for the CHC leadership was that they had a relatively high no show rate for screening appointments, despite devoting significant staffing resources to reminder calls. Together we developed an Interactive Voice Reminder (IVR) system that would allow a very inexpensive technology to conduct the majority of reminder calls, while reserving staff time for targeted outreach to patients who did not respond to the IVR system. We are utilizing a multiple baseline design to evaluate different combinations of intervention (e.g. IVR only; IVR plus outreach). Although the study is still underway, the IVR system appears to be successful in terms of both acceptability to patients (only 4% of patients have requested that they be removed from the system), and in terms of reaching patients. This intervention is feasible, scalable, and so far appears to be acceptable to both patients and the health care system.

It is also important to remember that the ‘real world’ includes policy settings, as well as practice settings. There is an increasing need for behavioral medicine scientists to engage in policy-relevant research, to ensure that health policies as implemented are evidence-based, and that they are effectively evaluated to determine if they have the intended impact (33). Eyler and colleagues examined whether evidence related to children’s participation in physical education is reaching policy makers and being incorporated into legislation. The good news is that over the last 10 years there has been a substantial increase in the number of PE bills introduced at the state level, doubling from about 70 bills in 2001 to 140 in 2007. The not so good news is that only about 25% of the bills that were introduced contained evidence-based elements. When considering those that were enacted or put into law (about 21% of those introduced), only one-third contained one or more evidence-based element, and only 35% required evaluation of the policy after enactment. In general there is very little focus on public policy research, particularly in the public health and behavioral medicine arenas. A recent audit of articles published in 16 public health journals between 1998 and 2008 revealed that only 3.7% of all articles published were policy-related, and there were no trends towards an increasing focus on policy research over time (34). This is a critical area for increased engagement from the behavioral medicine community, and one that will likely pay dividends in terms of increasing both translation of our evidence-base as well as our relevance.

Engaging in Comparative Effectiveness Research Will Improve our Balance Between Excellence and Relevance

Although several different definitions have been put forward (35–38), comparative effectiveness research (CER) is fundamentally the conduct and synthesis of research comparing the benefits & harms of different interventions in real world settings. With the health care reform debate over the past few years, CER has become a significant focus of attention. Unlike other research paradigms, CER does not consider the randomized control trial as the gold standard, but rather requires an openness to a range of different study designs, including quasi-experimental designs, observational studies, secondary data analysis, and modeling studies. Behavioral medicine engagement in CER is important in order to be in the vanguard of methods being used to make health care delivery decisions—but also because it allows an efficient approach to answering multiple research questions, including those of interest to both scientists and decision-makers. For example, in a study

designed to compare whether a web-based or text-message intervention is more effective in a particular setting, one could also answer questions about how to increase patients' engagement with the interventions, and whether the interventions have differential effects on patients' feelings of satisfaction with their health care. CER has potential to really help us address the issue of relevance, and to understand how better to influence behavior change and prevention at multiple levels of influence—including in systems and communities. Glasgow and Steiner (39) have introduced the notion of "CER-T", to denote pragmatic research in real world setting— or, in other words, research that will translate. They identify seven features of comparative effectiveness research that will have higher likelihood of translating, including: (1) being a pragmatic or practical trial (40, 41); (2) evaluating participation and representativeness (30); (3) ensuring that comparison conditions include real alternatives; (4) collecting cost and economic data; (5) assessing multiple outcomes using mixed methods; (6) using flexible research designs that are an appropriate fit with the research question and that consider threats to both internal and external validity; and (7) using transparent reporting metrics that include information on implementation and modifications, numerators and denominators of those invited, participating, and completing treatment (e.g. settings staff, patients) (30, 42).

My research team is currently conducting a CER study that is designed to help health system decision-makers know the marginal gains of different levels of intervention intensity, and to address important questions about how to best engage participants in self-directed interventions. *Healthy Directions 2* is being conducted in 36 physician practices in a managed care health center, among 2200 patients. Practices are randomized to either a web and print-based intervention addressing multiple risk behaviors (e.g. physical activity, red meat intake, fruit and vegetable intake, multi-vitamin intake, smoking), or to this intervention plus two brief coaching calls. The two interventions are being compared to usual care. We have also embedded an experimental study of whether reminder cues increase engagement with the intervention, whether they are feasible and acceptable, and whether different technologies have different impact on engagement. The study is still underway, but we do know that overall, about 80% of participants found the reminder cues to be supportive, and about 20% found them at least a bit annoying. Preliminary results suggest that there may be some differential impact of the reminder cues on engagement with different forms of the intervention—with those using the intervention primarily in print format having higher engagement when they received reminder cues, but no such impact on participants using the web format of the intervention. If we want our science to be relevant to practice settings, we have to be able to figure out how to maximize engagement, and what the marginal gains are with different intervention components, especially when there are different levels of cost involved. CER is a key approach that will help us maximize our relevance, while broadening our methodological approaches.

Interdisciplinary Approaches are Essential to Improving the Balance between Excellence and Relevance

I was fortunate to have an in-depth interdisciplinary collaboration early in my career. My team was developing an intervention using motivational interviewing to reduce infants' exposure to second-hand smoke exposure. A key component of motivational interviewing is

to provide data that allows participants to re-evaluate their behavior in the context of objective information. We included measures of parents' health, but needed to identify measures that would illustrate the impact of indoor smoking on children. In collaboration with an environmental scientist, we were able to adapt environmental air quality assessments for use in the intervention. This led to significant reductions in infants' exposure to second-hand smoke (43). Process evaluation data indicated that the feedback about household air quality was very powerful, and had a significant influence on parents' smoking behavior around their children.

Additional interdisciplinary work has allowed us to think critically about theories and approaches to health and health behavior, and what they contribute to our methods and approaches (44, 45). As illustrated in Figure 5, these different disciplinary "lenses" greatly influence how we define research questions and the methods that we use to answer them, ranging from the biomedical lens, which focuses on biologic processes; the psychosocial lens, which stays at the individual level; the epidemiology lens, which focuses on risk patterns within populations or groups; to the society and health or social epidemiologic perspective, which brings to the foreground large-scale cultural, social, and political processes, and seeks to understand pathways through which they produce differential risks. This more inclusive and broad approach to thinking about the influences on health and health behavior has had a significant impact in my work on understanding social context, and how it influences population level interventions.

Drawing on the Society and Health perspective, we conducted an intervention targeting multiple behavioral risk factors via a focus on social contextual factors in ten community health centers and found significant changes in multiple risk behaviors, as well as in individual risk factors (red meat intake, fruit and vegetable intake, and multi-vitamin intake). (46, 47) Several social contextual covariables were examined as potential confounders or effect modifiers. There was no confounding effect of gender, education, race/ethnicity, birth country of respondent and parents, or poverty status. In other words, an intervention that considered social contextual factors in its design and delivery eliminated all of the population group differences that we typically see in behavioral interventions—likely an important contribution of our interdisciplinary perspective.

Conclusions

Behavioral medicine has a long and proud tradition of research using the randomized clinical trial. Although this study design has served us well in many respects, it has likely reduced our ability to translate our science as rapidly as we would like. If we are truly to accelerate our impact, we should not bury our heads in the sand, restricting our focus to study designs that are familiar, and to the questions that interest us. Each and every one of us must consider the pressing questions facing those that we would like to use our work, and how we can increase our relevance to theirs. We need to work on the marriage of relevance and excellence—to use rigorous methodologies, but to be flexible in our approach, using study designs and methods that will get rapid yet rigorous answers to the questions facing practice and policy settings. We have the tools, we have the knowledge; together, we have the ability to truly impact the health of our nation.

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Figure 1.
Adult smoking prevalence US & Massachusetts, 1990–2005 (Massachusetts Department of Public Health, 2007)

Figure 2.
Adult smoking prevalence by educational level, MA, 1986–2005 (Massachusetts Department of Public Health, 2007)

Figure 3.
The impact of Medicaid coverage of pharmacotherapy on smoking prevalence among Medicaid subscribers (Land, Warner, Paskowsky et al, 2010, *PLos One*

Figure 4.
Health status by income (percent of the federal poverty level, FPL) and race/ethnicity
(Robert Wood Johnson Foundation, 2008)

Figure 5. Alternative disciplinary lenses for factors influencing health outcome (Sorensen, Emmons, Hunt, et al, 2003, *Prev Med*; Sorensen *et al*, Annual Review of Public Health, 1998)