Behavioral medicine, cancer control, and NCI: reflections on a fruitful past and auspicious future

William M. P. Klein

Abstract
Cancer prevention and control has benefited substantially from behavioral medicine research over the last several decades. The National Cancer Institute’s (NCI) Division of Cancer Control and Population Sciences, ably led by Barbara Rimer and then Bob Croyle since being established in 1997, has been a primary supporter of this research. NCI has made significant investments in many of the topics featured in this special section and will continue to do so. These include research on basic behavioral processes such as affect as well as optimal approaches to health communication. A key and enduring focus has been the support of behavioral interventions, particularly for tobacco, diet, physical activity, and sun exposure. The success of such interventions will be amplified to the extent that they leverage novel research designs, emerging digital technologies, evidence gleaned from the burgeoning field of implementation science, and lessons learned from greater attention to the impact of health disparities and inequities. Moreover, as the cancer survivor population continues to grow given the rapid development of diagnostic and therapeutic science, it will be even more essential to devote attention to understanding and addressing the health care and other needs of survivors such as cognitive dysfunction and financial toxicity. The field of behavioral medicine should be both applauded for its many contributions to reducing the cancer burden and encouraged to continue developing new research ideas in these critical areas.

Keywords
Behavioral risk factors, Health behavior, Behavioral medicine, Social sciences, Cancer prevention and control

The first paragraph of a typical article on cancer prevention and control inevitably makes the well-rehearsed yet critical point that human behaviors, such as tobacco use and sedentary behavior, account for nearly half of all cancer cases [1–3]. Nevertheless, widespread appreciation of the role of human behavior in cancer morbidity and mortality is still relatively new. As nicely illustrated in treatises on the history of cancer research, such as Siddhartha Mukherjee’s Emperor of All Maladies: A Biography of Cancer [4], much of the earliest work on cancer focused on etiology and treatment. The National Cancer Act of 1971—the 50th anniversary of which was celebrated in 2021—helped plant the seeds for a more integrative approach to cancer research by supporting comprehensive cancer centers, building a gold standard national cancer surveillance network (the Surveillance, Epidemiology, and End Results Program [SEER]), and fostering a trans-agency approach to cancer prevention and control.

As the implications of this historic legislation began to materialize in the 1970s, new directions were also emerging concurrently in the behavioral sciences. The cognitive revolution took hold, leaving behind Skinner’s “black boxes” and underscoring the importance of judgment, perception, and reasoning in the human experience—an important precursor to research on predictors of cancer risk, attitudes, and behaviors. Fundamental areas of psychology—particularly clinical psychology, personality psychology, and social psychology—helped build the burgeoning new field of health psychology (with an initial focus on cardiovascular medicine), and by extension, one of social science’s first successful attempts at truly interdisciplinary research: behavioral medicine [5]. Behavioral medicine now has its own associations and journals, including this one.

Fortunately, the fields of cancer prevention and behavioral medicine were destined to collide. One can point to any number of possible catalysts, but there is no doubt that the dramatic increase in attention to tobacco use as a potent and preventable cause of cancer was a principal development. Behavioral medicine researchers—particularly those aligning with the then-nascent area of tobacco control—helped identify causes of addiction, develop psychological and pharmacological methods to facilitate cessation, build resources such as quitlines, and contribute to the research base supporting key policy levers such as increased tobacco taxes and smoke-free laws [6, 7].

Tobacco control, as well as a focus on diet and nutrition, soon became key foci of the National Cancer Institute’s (NCI) Division of Cancer Prevention and Control (DCPC), established in 1983. Resources were devoted to high-impact projects such as the American Stop Smoking Intervention Study [8] and the National 5-A-Day Program encouraging fruit and vegetable intake [9]. Once the wide breadth of research required for evidence-based cancer prevention and control became apparent, NCI separated...
DCPC into two divisions in 1997. The Division of Cancer Prevention (DCP) was expected to focus on chemoprevention and screening trials, whereas the aegis of the Division of Cancer Control and Population Sciences (DCCPs) included epidemiology, surveillance (the home of SEER), applied research, survivorship, and, importantly, the behavioral sciences.

Dr. Barbara Rimer was appointed as the first Director of DCCPS, and as she describes in her contribution to this special section (Rimer [10]), she succeeded in recruiting Dr. Robert (Bob) Croyle to lead the division’s new Behavioral Research Program (BRP). Barbara and Bob got off to a fast start, building capacity in several scientific areas that continue as research priorities to this day including tobacco control, energy balance (i.e., diet, nutrition, sedentary behavior, and physical activity), screening adherence, health communication, and basic behavioral science. As Rimer [10] explains, Bob then became Director of DCCPS in 2003 and has had an impactful tenure in that position. He has built capacity in many key areas of cancer control such as implementation science and health disparities, as well as fostered partnerships with sister agencies such as the U.S. Food and Drug Administration and Centers for Disease Control and Prevention. Since the establishment of DCCPS, NCI has provided financial and other support for a wide variety of scientific themes under the cancer control umbrella across the entire cancer control continuum from prevention through end of life. Many are represented in the pages of this special section of *Translational Behavioral Medicine*.

A thorough integration of behavioral medicine and cancer control starts with an appreciation of what the basic behavioral sciences bring to the table. For example, a fundamental understanding of mechanisms underlying stress and aging processes informs research on cancer etiology and trajectory [11]. Principles of perception and attention influence the accuracy of radiologists’ assessments [12, 13], leading NCI to facilitate pop-up labs at radiology conferences to collect data directly from radiologists. One effort representing NCI's interests in basic behavioral science related to health priorities.

Since its inception, OppNet has issued 34 funding opportunity announcements, resulting in over 200 grants on high priority topics like self-regulation and social isolation (see https://obssr.od.nih.gov/about/opppnet).

As illuminated in Ferrer’s [17] contribution to this special section, basic research on affect and decision making can contribute to a more comprehensive view of how people make critical cancer-related decisions. To this end, NCI issued a funding opportunity on affective and decision processes in cancer research (see https://grants.nih.gov/grants/guide/par-20-034.html) and continues to seek research in this area. Of course, adequate decision making in contexts like cancer screening and genetic testing requires a sophisticated understanding of effective health communication, as described in Tercyak's [18] special section commentary. Accordingly, NCI hosts the only entity at the NIH focused exclusively on health communication research—the Health Communication and Informatics Research Branch—which has devoted substantial resources to decision making and cancer communication. Their investments include funding of the Centers of Excellence in Cancer Communication Research (CECCR) (see https://maps.cancer.gov/overview/map/initiative/grantlist.jsp?initiativeType=RFA&initiativeId=1135&fly=ARCH) [19]. Findings from these centers helped communication efforts to move away from the “hypodermic” model whereby messaging is construed as unidirectional to a model that recognizes the importance of audience involvement.

NCI has a rich portfolio of grants in areas such as social media, patient-provider communication, and health messaging [20]. Importantly, NCI will continue to prioritize cutting-edge research in these areas, with special attention to understanding the prevalence and impact of health misinformation [21]—the importance of which has been amplified during the recent COVID-19 pandemic. A Surgeon General’s Advisory on health misinformation [22] relied, in part, on contributions by NCI staff. NCI also administers the Health Information National Trends Survey (HINTS) on a yearly or biennial basis, adding a subsample of over 1,000 cancer survivors in 2021. Ongoing efforts in the HINTS program are directing attention to relatively newer areas like genetic testing, informal caregiving, palliative care, and communication-based policies such as product labeling. Over 600 publications feature HINTS data (see https://hints.cancer.gov/).

A major priority of NCI’s BRP since its inception has been the funding of interventions to address principal behavioral risk factors for cancer including tobacco use, sedentary behavior, poor diet, and exposure to ultraviolet radiation. Over the last 20+ years, however, the appeal of “kitchen sink” interventions that include a melange of strategies has begun to wane in favor of more thoughtful
approaches that attempt to identify necessary and sufficient elements of an intervention—optimizing both practical efficiency and scientific advancement. This approach has been accelerated by the availability of novel methodologies including the multiphase optimization strategy and the sequential multiple assignment randomized trial, as described by Linda Collins, the architect of these strategies, in her accompanying commentary (Collins [23]). In addition, NIH introduced models of behavior intervention development that better mirror the phases of conventional drug development, such as the Obesity-Related Behavioral Interventions model [24]. The recently completed Science of Behavior Change initiative supported by the NIH Common Fund, which included substantial NCI involvement, stressed the importance of targeting mediating mechanisms when designing behavioral interventions, akin to the “experimental medicine approach” [25]. Importantly, intervention design must consider the myriad ways cultural groups differ, as emphasized by Hughes-Halbert [26] in her accompanying commentary. Critics of behavioral science lament that many findings are based on data collected from so-called “WEIRD” samples (White, Educated, Industrialized, Rich, and Democratic), limiting generalizability to other typically underserved populations that in many cases have a more urgent need for effective interventions.

NCI will continue to support research that takes full advantage of novel and more efficient methodological approaches, as well as innovations in digital technologies—many of which are featured in Hesse’s [27] commentary in this special section. Moreover, research at the cancer prevention and behavioral medicine juncture will need to pay attention to the changing behavioral landscape; for example, whereas tobacco control researchers have focused primarily on conventional cigarettes for many decades, they now must grapple with diverse tobacco products including Electronic Nicotine Delivery Systems and heated tobacco products, as well as cannabis. Moreover, attention to alcohol as a risk factor for several cancers including breast and colorectal has amplified the need for NCI to support research in this area (see https://cancercontrol.cancer.gov/is/training-education/TIDIRC) and Evidence-Based Cancer Control Programs (formerly Research Tested Intervention Protocols, see https://ebcp.cancercontrol.cancer.gov/index.do). NCI also considers the Behavioral Medicine Research Council, a collaborative effort of several professional associations in behavioral medicine with the goal of designing large multisite trials in behavioral medicine, to offer a promising model for future research in this area.

The focus on basic behavioral science, communication, and intervention extends in many important ways to the cancer survivor population, which is growing dramatically due, in large part, to the efficacy of new treatments and screening interventions [29, 30]. Healthy behaviors among survivors reduce the risk of recurrence, metastasis, and secondary cancers, highlighting the importance of developing interventions and evidence-based resources for this population. Accordingly, NCI funded 52 cancer centers (see https://cancercontrol.cancer.gov/brp/terb/cancer-center-cessation-initiative#table-tc) to strengthen tobacco cessation resources available to cancer patients [31, 32], and funded several investigators addressing energy balance in survivors as part of the Transdisciplinary Research in Energetics and Cancer initiative and with a Program Announcement on physical activity and survivorship (see Physical Activity and Weight Control Interventions Among Cancer Survivors: Effects on Biomarkers of Prognosis and Survival, https://grants.nih.gov/grants/guide/par-files/PAR-18-893.html).

As Hudson [33] notes in a compelling contribution to this special section, the quality of cancer care delivery needs much improvement and can benefit from what we have learned about successful multi-level translational behavioral interventions. NCI seeks to leverage behavioral medicine to improve cancer care; for example, there has been much interest in the positive impact of palliative care early in the care trajectory [34, 35]. Behavioral medicine research seeks to better understand and ameliorate the negative effects of cancer and its treatment, including cognitive dysfunction, fatigue, insomnia, and renegotiation of relationships. Unfortunately, many patients also experience financial toxicity due to the high cost of cancer care, an area of research summarized in a special section piece by Peppler [36]. NCI’s Office of Cancer Survivorship takes a holistic and comprehensive view of the survivorship experience and encourages innovative ideas in all of these areas.

Advancing cancer control over the next decade will, of course, require meticulous consideration of the wider cultural context [37]. The United States’ reckoning with systemic racism has heightened attention to the importance of research on health disparities and inequities—not just observational studies documenting their presence (which are represented in Cancer (see https://cancercontrol.cancer.gov/is/training-education/TIDIRC) and Evidence-Based Cancer Control Programs (formerly Research Tested Intervention Protocols, see https://ebcp.cancercontrol.cancer.gov/index.do). NCI also considers the Behavioral Medicine Research Council, a collaborative effort of several professional associations in behavioral medicine with the goal of designing large multisite trials in behavioral medicine, to offer a promising model for future research in this area.

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amply in the literature) but also studies that demonstrate how to reduce them. Disparities in cancer prevention, care, morbidity, and mortality emerge in many different populations—from non-Hispanic Black populations, for whom invasive breast cancers occur at younger ages and at more advanced stages [38]; to HIV+ populations, where the leading cause of cancer death is now lung cancer due to high tobacco use; to rural populations, where broadband access erodes quality healthcare [39], as a few examples. Nearly 70% of the NCI’s DCCPS grant portfolio addresses these and other disparities. It will be essential to design and disseminate interventions that can be adjusted as needed to be responsive to the unique needs of different populations (see Beidas [28], this volume). Fortunately, NCI and NIH consider attention to systemic racism and health disparities to be high priorities, developing new initiatives such as UNITE (see https://www.nih.gov/ending-structural-racism/unite) to support the research community in efforts to address many thorny problems in this space.

At the time of this writing, we are in the midst of an unparalleled pandemic that will likely have lasting implications for the integration of behavioral medicine and cancer control research—from downstream effects on cancer-relevant risk behaviors to the burgeoning use of telehealth (see NCI’s recent Request for Applications on this topic: https://grants.nih.gov/grants/guide/rfa-files/RFA-CA-21-029.html), to the need for effective messaging about managing COVID-19 risk in the context of cancer prevention (e.g., screening), and cancer treatment (see also Hudson [33]). Behavioral medicine is well poised to address these and many other consequences, and NCI welcomes innovative ideas in this space.

Cancer control has come a long way over the last few decades, due in no small part to the efforts of numerous scholars from many disciplines associated with the field of behavioral medicine. Given the hefty contribution of behavior to the cancer burden, the impact of this work cannot be overstated. NCI applauds the field for its many contributions to the institute’s mission of decreasing the cancer burden and stands ready to continue to support this work given the many gaps that still remain. The field of behavioral medicine—and the organizations that support it, such as the Society of Behavioral Medicine, this journal’s sponsor—have already exerted a significant impact on cancer control and public health more generally and have the capacity to do much more over the next 10 years, and certainly beyond that. With a fruitful past and an auspicious future, our collective efforts will have the mutual benefit of promoting scientific progress and saving many lives along the way.

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Compliance with Ethical Standards

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References


