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Cancer-Related Direct-To-Consumer Advertising - A Study of its Antecedents, Influence on Patient Information Seeking Behaviors, and Contingent Effects

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Abstract

Direct-to-consumer advertising (DTCA) of prescription medications and healthcare facilities has generated much debate over the potential benefits and adverse consequences for the public at large, patients, clinician-patient relationships, and the overall healthcare system. This dissertation is aimed at contributing to this debate through studying the impact of DTCA in the context of cancer treatment. Study 1 assessed the reliability and validity of three candidate measures of patient-reported exposure to cancer-related DTCA across seven criteria. The study found that all three measures performed well in terms of convergent, nomological, discriminant, and face validity. Findings from this study offer support for utilizing these survey measures in future studies targeting cancer patients. Next, Study 2 examined the prevalence and correlates of cancer-related DTCA exposure in a sample of patients in Pennsylvania diagnosed with breast, prostate, or colorectal cancers. On average, patients reported modest exposure to such DTCA (median exposure was once per week). Significant correlates of exposure included cancer type, age, stage of disease, and ethnicity. Study 3 investigated the relationships between DTCA exposure and subsequent information seeking behaviors. The analyses detected a significant association between DTCA exposure and cancer patients' subsequent information engagement with their clinicians at one-year follow-up. Exposure to DTCA was marginally significant in predicting information seeking from non-clinician (lay media and interpersonal) sources. Based on the Integrative Model of Behavioral Prediction, a focused analysis showed a significant indirect path between DTCA exposure and subsequent information seeking from non-clinician sources, mediated through attitudes and intention to seek from these sources. Study 4 was guided by the Structural Influence Model of Communication to explore disparities in health information seeking behaviors arising from DTCA exposure. The study found that the associations between DTCA exposure and active information seeking behaviors were not moderated by patients' age, educational level, race/ethnicity, or cancer type. To conclude, these studies would likely inform the ongoing debate and future research regarding the impact of cancer-related DTCA exposure on communication outcomes and disparities.

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CANCER-RELATED DIRECT-TO-CONSUMER ADVERTISING – A STUDY OF ITS ANTECEDENTS, INFLUENCE ON PATIENT INFORMATION SEEKING BEHAVIORS, AND CONTINGENT EFFECTS

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Dedication

I dedicate this dissertation in memory of my grandmother, Siang Cheng Soh. Her love, support, and encouragement will always sustain me in all that I do.

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ABSTRACT

CANCER-RELATED DIRECT-TO-CONSUMER ADVERTISING – A STUDY OF ITS ANTECEDENTS, INFLUENCE ON PATIENT INFORMATION SEEKING BEHAVIORS, AND CONTINGENT EFFECTS

Andy Soon Leong Tan

Robert C Hornik

Direct-to-consumer advertising (DTCA) of prescription medications and healthcare facilities has generated much debate over the potential benefits and adverse consequences for the public at large, patients, clinician-patient relationships, and the overall healthcare system. This dissertation is aimed at contributing to this debate through studying the impact of DTCA in the context of cancer treatment. Study 1 assessed the reliability and validity of three candidate measures of patient-reported exposure to cancer-related DTCA across seven criteria. The study found that all three measures performed well in terms of convergent, nomological, discriminant, and face validity. Findings from this study offer support for utilizing these survey measures in future studies targeting cancer patients. Next, Study 2 examined the prevalence and correlates of cancer-related DTCA exposure in a sample of patients in Pennsylvania diagnosed with breast, prostate, or colorectal cancers. On average, patients reported modest exposure to such DTCA (median exposure was once per week). Significant correlates of exposure included cancer type, age, stage of disease, and ethnicity. Study 3 investigated the relationships between DTCA exposure and subsequent information seeking behaviors.

The analyses detected a significant association between DTCA exposure and cancer patients’ subsequent information engagement with their clinicians at one-year follow-up. Exposure to DTCA was marginally significant in predicting information seeking from non-clinician (lay media and interpersonal) sources. Based on the Integrative Model of Behavioral Prediction, a focused analysis showed a significant indirect path between DTCA exposure and subsequent information seeking from non-clinician sources, mediated through attitudes and intention to seek from these sources. Study 4 was guided by the Structural Influence Model of Communication to explore disparities in health information seeking behaviors arising from DTCA exposure. The study found that the associations between DTCA exposure and active information seeking behaviors were not moderated by patients’ age, educational level, race/ethnicity, or cancer type. To conclude, these studies would likely inform the ongoing debate and future research regarding the impact of cancer-related DTCA exposure on communication outcomes and disparities.

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Introduction

The practice of direct-to-consumer advertising (DTCA) for prescription medications and healthcare services is controversial in the United States and subject to much debate involving stakeholders ranging from consumer interest groups, medical professionals, the pharmaceutical industry, and regulatory agencies (Bonaccorso & Sturchio, 2002; Fox & Ward, 2008; Frosch, Grande, Tarn, & Kravitz, 2010; Hoen, 1998; Hollon, 1999, 2005; Holmer, 1999, 2002; E. T. Rosenthal, 2010b). On one side there are arguments that DTCA potentially provides educational information for consumers that leads to patient empowerment, increases patient adherence to treatment, and subsequently improves patient outcomes (Calfee, 2002). Conversely, critics counter that possible adverse effects of DTCA include patients being misled with inaccurate information intended to sell a product, alteration of patient-physician relationships, inappropriate use of prescription drugs, side-effects from over-treatment, and ballooning healthcare costs (Lipsky & Taylor, 1997). Thus far, purported benefits and adverse consequences of DTCA voiced by both sides of the debate are not convincingly borne out in research over the past two decades, underlining the need for more inquiry on the implications of DTCA, if any, on physician or patient behaviors and on health outcomes.

Extending from the broader debate of the overall benefits and risks of DTCA in general, more recent research is being conducted to examine the impact of specific kinds of DTCA that targets patients who are diagnosed with certain severe medical conditions. Studies that focus on DTCA for treatments of cardiovascular disease and cancer—disease conditions requiring complex care—are two such examples of research on specific kinds of DTCA. In the case of such "subspecialty DTCA", the specialized nature of treatments, complicated technical information, higher risks of adverse outcomes, and higher costs justify greater skepticism about claims of educational benefits of such advertising for patients and calls for heightened scrutiny of its impact on patient perceptions, decision-making processes, and health outcomes (Abel, Burstein, Hevelone, & Weeks, 2009).

This dissertation research addresses knowledge gaps associated with one specific form of "subspecialty DTCA", that is cancer-related DTCA. For the purpose of this present research, cancer-related DTCA is defined as "promotional efforts by a pharmaceutical company, healthcare provider, or medical facility to present information about medications, medical devices, or medical services for patients diagnosed with cancer in the lay media environment" (adapted from Wilkes, Bell, & Kravitz, 2000). In the following sections, I outline the purpose of each study in this research, rationale for engaging in research specifically on cancer-related DTCA, historical and regulatory background of DTCA, and relevant literature on DTCA research underpinning this dissertation project. More detailed literature reviews relevant for the research objectives of each of the four individual studies are included in the introduction sections of the respective studies.

Purpose

The overall purpose of this dissertation project is to study the antecedents of patients' exposure to DTCA, assess the influence of DTCA on patient information seeking behaviors, and examine communication disparities associated with DTCA in the specific context of cancer treatment. This research includes four distinct but inter-related studies. Laying the groundwork for this research is Study 1, which assessed the reliability and validity of a set of self-reported survey measures to elicit patients' frequency of exposure to DTCA. Findings from this study provide important validity information on the use of measures employed in existing surveys when compared with alternative approaches of measuring exposure to DTCA. These validation results further provide support for justifying the use of self-reported measures of DTCA exposure in examining the research questions in the remaining studies.

Next, Study 2 is an analysis of survey data from a population-based sample of cancer patients to provide information on the correlates of patients' DTCA exposure. This study assessed whether there is differential exposure of DTCA across different patient characteristics and the potential for communication disparities. Briefly, this study compared the frequency of exposure to DTCA between patients across different cancer diagnoses (breast, prostate, or colorectal cancer), race/ethnicity, levels of educational attainment, and age groups. Disparities in exposure to DTCA based on individual characteristics may have important implications for reinforcing existing health disparities in cancer outcomes among socially advantaged and disadvantaged groups.

Study 3 investigated the associations between DTCA exposure and cancer patients' subsequent information seeking behaviors. This study offers empirical evidence to inform the ongoing debate about the spillover informational benefit of DTCA on broader patient information engagement about managing their illness. The study further identifies potential psychosocial mechanisms that may account for DTCA motivating health information seeking behaviors.

Guided by the Structural Influence Model of Communication, Study 4 built on Studies 2 and 3 to analyze whether the lagged associations between DTCA exposure and health information seeking behaviors are contingent upon various patient characteristics. This study aims to contribute to the literature in communication inequalities associated with public health information in the context of cancer care by assessing whether age, educational level, race/ethnicity, and cancer type moderate the above associations. Presence of communication disparities may have implications for widened disparities in cancer outcomes among certain patient groups.

Rationale

There are several reasons for focusing on cancer treatment advertising in this dissertation research. From an epidemiological standpoint, cancer is the second leading cause of mortality in the U.S., accounting for an estimated 573,855 deaths in 2010, or more than 1,500 people a day (Murphy, Xu, & Kochanek, 2012). Cancer survivors number approximately 11.7 million Americans (last estimated in 2007) and close to 1.6

million new cancer cases are expected to be diagnosed each year (American Cancer Society, 2011). Given the sizable proportion of the population for whom cancer-related DTCA would be salient, efforts to better understand potential impacts of cancer treatment advertising on cancer patients are justifiable.

As noted earlier, in terms of weighing the risks versus educational benefits of subspecialty DTCA, cancer treatment is often specialized in nature, requires multi-disciplinary care, potentially involves serious adverse effects, and is associated with high costs. Such complex information about cancer treatment is arguably less amenable to convey using direct advertising to patients when compared to DTCA that are targeted for less life-threatening symptoms or conditions where the stakes are not as high (Abel et al., 2009). In other words, direct educational benefits posited by DTCA advocates appear less compelling in the case of cancer treatment, especially given the complexity and urgency associated with the disease trajectory of many forms of cancer. It is equally important to consider that there may be risks of cancer-related DTCA in encouraging inappropriate treatments or over-utilization of healthcare among certain cancer patients with advanced stage illnesses when curative treatment options may be limited. Research on the informational impact of cancer-related DTCA is important to provide empirical evidence to help evaluate the risks and benefits of such DTCA on cancer outcomes.

Another reason for focusing on DTCA in cancer care is related to mounting recognition that cancer patients are actively engaging and navigating through the rapidly evolving and potentially confusing public health information environment (Viswanath, 2005). DTCA contributes to this relentless profusion of health information on cancer treatment available to healthy individuals, those who are at-risk (e.g., individuals with strong family history of cancer), or newly diagnosed cancer patients alike. Literature on cancer communication suggests cancer patients have a wide variety of information needs and engage with various information sources to meet these needs (Rutten, Arora, Bakos, Aziz, & Rowland, 2005; Rutten, Squiers, & Hesse, 2006). One qualitative study indicated cancer patients frequently report cross-source use of information, moving from traditional media sources (e.g., broadcast television or print newspapers and magazines)—where DTCA are usually presented—to other sources including their physicians or other health professionals, lay interpersonal contacts, and the internet (Nagler, Romantan, et al., 2010). A survey among cancer patients in Pennsylvania found about one in five patients (19%) bring information from traditional media sources (i.e., television, radio, newspapers, or magazines) to discuss with their treating doctors (Lewis, Gray, Freres, & Hornik, 2009). Some of this information from media sources may conceivably include treatment ads although the study did not specify the type of information that patients bring to discuss with their physicians. In this dissertation research, one objective is to add to the growing literature on cancer communication by examining how DTCA contributes to this dynamic process of patients' active information engagement across varied sources for managing their illness.

A further motivation for focusing on cancer-related DTCA is the concern over the impact of DTCA on patient-provider relationships. To address this concern, Abel and colleagues (2009) examined the extent to which cancer patients from one cancer center receiving active treatment discuss cancer-related DTCA with their clinicians. Mirroring the above research by Nagler et al. (2010) and Lewis et al. (2009) on cross-source information seeking, Abel and colleagues (2009) also reported that under one in five patients (17%) who were aware of DTCA for cancer-related prescription medications had been prompted by an ad to talk to their cancer doctor or nurse about a prescription drug in the past year. This suggests that DTCA may not be a prominent factor in influencing patient-provider discussions about cancer treatment options among cancer patients receiving active treatment. The study was limited by the convenience study sample of patients within a single cancer center and the emphasis on interactions about drug information rather than discussions about treatment more broadly. One objective in this dissertation research is to address the above gaps in understanding the role of DTCA in relation to the patient-provider interactions surrounding cancer-related treatment information.

Historical and Regulatory Background

An exhaustive review of how DTCA became prevalent, development of regulations for DTCA, and evolution of stakeholder perspectives about DTCA is beyond the scope of this project and is more amply described elsewhere (Donohue, 2006; Palumbo & Mullins, 2002; Pines, 1999; Terzian, 1999; J. H. Young, 1961). However, a brief account of the growth and regulation of DTCA is necessary to provide a historical context for this dissertation project.

The advent of promoting medicinal treatments in the U.S. can be traced to 1708 when Nicholas Boone, an apothecary in Boston, first paid a fee to place a newspaper ad for a patent medicine (J. H. Young, 1961, 1967). Leading up to the 20th-century, patent medicine ads accounted for a substantial proportion of newspaper publishers' advertising revenues (J. H. Young, 1961, 1967). During this period, it was the norm for patients to engage with self-treatment using such advertised products and regulations of patent medicines were not yet in place to ensure public safety. This was also an era when physicians had not yet achieved the role as professional gatekeepers of potentially harmful medicinal substances as they have today (Donohue, 2006).

Norms of direct consumer access to medicinal products gradually shifted toward more restricted access due to increased regulation of the drug industry beginning in the turn of the 20th-century. In 1906, President Theodore Roosevelt signed into law the Pure Food and Drugs Act to ensure the quality and purity of drugs through the requirement of stricter regulation on labeling contents of medicinal products. While the law prohibited misleading information about ingredients of a drug as stated on labels, it did not limit false therapeutic claims from appearing on such labels that could misinform consumers of drug benefits (Donohue, 2006). Subsequent passage of the Food, Drug, and Cosmetic Act (FDCA) in 1938 improved drug safety by requiring manufacturers to obtain U.S. Food and Drug Administration (FDA) approval of drugs prior to marketing and sale. The 1938 FDCA included additional stringent requirements for drug labeling and provision of consumer instructions on the packaging. Legislative amendments to the FDCA between

1938 and 1969 gradually reduced the direct availability of many over-the-counter (OTC) medications to consumers. Over time, these legislations increasingly limited patients' access to many drugs through physician prescription only, raised the requirements for proving safety and effectiveness of drugs, and introduced various advertising regulations for drug manufacturing companies (Donohue, 2006). These regulations progressively restricted consumer self-treatment while boosting the role of physicians as gatekeepers to substances that are potentially harmful if used without appropriate medical supervision.

The paradigm shift in increased regulatory oversight of medicines and evolving importance of physicians to gain access to medications dramatically reduced direct advertising to consumers by drug manufacturers. As a result, in the ensuing decades, prescription medication promotional spending remained largely directed at physicians. The predominance of marketing to physicians rather than directly to consumers is still the case today. Some examples of physician-directed promotions currently in practice include paid advertising in medical journals, detailing by sales representatives, and direct mailing to physicians (Harris, 1964; Rehder, 1965).

By the 1980s, a small number of ads for drugs and vaccines began appearing in print publications, radio, and television (Donohue, 2006; Kolata, 1983). Following public concerns surrounding the risks of misleading drug ads, FDA requested a two-year voluntary moratorium on DTCA in 1983, during which the first consumer survey was conducted to assess public perceptions and behaviors regarding DTCA. This moratorium was lifted in 1985 and FDA announced that standards for ads directed at physicians would be applied to DTCA (Terzian, 1999). The FDA guidance in 1997 spelt out ways that drug manufacturers could advertise their products on broadcast media. Subsequent amendments to this guidance in 2007 gave FDA the authority to review television ads for drugs prior to dissemination (Food and Drug Administration, 2007, p.939). However, in practice, the FDA review process has not kept pace with the rapid growth in the volume of DTCA. Repeated audits by the General Accounting Office revealed that the FDA did not have sufficient resources to effectively monitor and prevent drug companies from disseminating DTCA that contained misleading information (United States General Accounting Office, 2002, 2006, 2008). Although the guidelines are in place with various restrictions, the floodgates have been opened, permitting drug manufacturers to promote prescription medications directly to consumers and resulting in a rapid increase in the placement of DTCA on broadcast media.

While the focus has been on DTCA of prescription drugs historically, recent developments in promoting medical treatments encompass direct advertising of other forms of health-related products and services. Examples of these advertising include hospitals or doctors offering medical services in specialized clinics or medical centers or ads for innovative types of medical devices. In contrast to regulatory safeguards for prescription drugs DTCA, this recent trend of healthcare providers or medical facilities advertising treatment services directly to consumers is not under similar federal oversight (E. T. Rosenthal, 2010a, 2010b). One study on the frequency and content of promotional ads by reputable academic medical centers reported the majority of such ads include emotional appeals and highlight the prestige of institutions in targeting prospective patients. These ads often do not undergo any review by the respective institutional review boards (Larson, Schwartz, Woloshin, & Welch, 2005). The authors proposed that in the interests of patient protection and consistency with FDA guidelines that regulate advertising for the purpose of recruiting research participants, there is a need for more oversight on such promotional activities conducted by healthcare institutions.

Promotional Spending on DTCA

Overall industry promotional spending on prescription drugs through DTCA increased dramatically, quadrupling from $985 million in 1996 to $4.2 billion in 2005 (Donohue, Cevasco, & Rosenthal, 2007). Recent data indicate that DTCA spending reached a peak of $5.9 billion in 2006 and stabilized at $4.4 billion by 2010 (Kornfield, Donohue, Berndt, & Alexander, 2013). Despite these large sums, DTCA spending to date represents only a small proportion of total promotional expenditures by pharmaceutical manufacturers; DTCA accounted for about 19% of overall promotional expenses in 2010 (Kornfield et al., 2013). DTCA spending also accounts for a minor cost to manufacturers as a percentage of sales, ranging from 1.4% to 2.0% between 2001 and 2010 (Donohue et al., 2007; Kornfield et al., 2013). This is largely because the absolute value of the pharmaceuticals market has grown phenomenally. In contrast, promotional spending directed at physicians and free samples are still the dominant forms of drug advertising. In 2010, manufacturers spent $23.3 billion on promotion to providers, constituting the majority of the overall industry promotional spending based on reported expenditure trends and accounting for 7.6% of drug sales (Kornfield et al., 2013). This was almost five times the amount spent on DTCA in the same year.

Nevertheless, the volume of prescription drug DTCA available in the public sphere and resultant exposure to consumers are sizeable. This is illustrated in a study by Brownfield and colleagues (2004) who reported that 428 prescription medication ads appeared over the period of one sampled week on three major television networks in Atlanta, Georgia. These ads occupied 311 minutes of airtime, translating to over 16 hours of exposure to such ads per year for an average television viewer. The authors contrasted this amount of exposure to DTCA of prescription medications with an average American spending approximately 15 minutes each year with her primary care physician.

Promotional spending by healthcare providers and facilities is smaller in comparison to prescription drug promotional spending but this is still substantial and growing steadily. Between 2001 and 2005, promotional spending by hospitals, clinics, and medical centers nearly doubled from $493 million to $810 million (American Medical Association, 2006). A more recent report indicated American hospitals increased their ad spending from $596 million in the first six months of 2010 to $717 million in the same period in 2011, representing a year-on-year increase of 20% (Newman, 2011).

There is limited data on promotional spending trends aggregated by disease condition or on the expenditures for subspecialty advertising such as cancer-related DTCA. At present, there is no published source of information on overall promotional spending for cancer-related treatment specifically. One recent study obtained data on advertising spending for three select brands of aromatase inhibitors (i.e., anastrozole, letrozole, and exemestane for reducing breast cancer recurrence risk in postmenopausal women) between 2005 and 2007 and reported that monthly expenditures of DTCA on these brands varied considerably between about $120,000 to over $22 million (Abel et al., 2013). However, there is some evidence that cancer-related DTCA constitutes only a minor component of the overall promotional spending on DTCA for prescription medications. Studies reporting the top twenty pharmaceutical drugs in terms of ad spending did not find cancer-related medications featuring among these highly advertised drugs (Donohue et al., 2007; M. B. Rosenthal, Berndt, Donohue, Frank, & Epstein, 2002). Based on content analyses of ads in consumer print magazines, cancer-related DTCA for prescription drugs occurs less frequently than DTCA related to other health conditions including allergies, oral contraceptives, HIV and AIDS, and dermatological conditions (Bell, Wilkes, & Kravitz, 2000; Welch Cline & Young, 2004; Wilkes et al., 2000; Woloshin, Schwartz, Tremmel, & Welch, 2001). One reason may be oncology-related medications ads tended to appear more frequently in magazines targeted for cancer patients (e.g., *CURE, Coping with Cancer*, and *MAMM: Women, Cancer & Community*) rather than in general interest magazines (Abel, Lee, & Weeks, 2007).

Similarly, systematic data sources on promotional spending by healthcare providers and medical facilities for cancer treatment services are absent. Cancer centers are seen as reluctant in revealing their advertising activities to attract patients (E. T.

Rosenthal, 2010a, 2010b). A few studies provide some indication of the extent of promotion by healthcare providers for cancer treatment. In one recent analysis of 400 U.S. hospital websites, Jin et al. (2011) reported 41% of these websites described robotic surgery. Of these sites, 32% made claims of improved cancer control with robotic surgery. In another content analysis of print ads in local newspapers by 17 nationally acclaimed academic medical centers, researchers showed cancer treatment services were advertised less frequently compared to other health conditions or healthcare services (Larson et al., 2005). The study found that 10 of 122 unique print ads from these medical centers promoted cancer treatment services. The study excluded print ads meant for patient recruitment into clinical trials or public announcements of community events unrelated to promoting hospital services. These findings suggest more research may be warranted to document the prevalence and promotional spending of cancer-related DTCA among medical centers.

Consumer Awareness and Opinions of DTCA

Several consumer surveys over the past decade consistently found overall public awareness of DTCA in general to be high (Aikin, Swasy, & Braman, 2004; Murray, Lo, Pollack, Donelan, & Lee, 2004). One survey conducted by the FDA reported 81% of a national sample of adults were aware of DTCA in 2002 (Aikin et al., 2004). Another survey conducted among adults in Sacramento, California found that awareness of 10 drugs advertised at the time of the study ranged from 8% to 72%. On average, respondents reported being aware of four drug ads out of the 10 ads that were shown to them (Bell, Kravitz, & Wilkes, 1999).

Public opinion about DTCA was mixed based on the FDA national survey. While the majority of respondents agreed DTCA helped make them aware of new drugs (77%) and provided enough information to decide whether to visit a physician (58%), a sizable proportion agreed DTCA made the drug seem better than it was (58%) and made it seem as though a doctor was not needed to make decisions about prescribing the drug (23%) (Aikin et al., 2004).

Surveys have been conducted on awareness and opinions of specific cancer-related DTCA of prescription medications among cancer patients. In one study among cancer patients who were receiving active treatment for hematologic and breast cancers, Abel et al. (2009) found 86% of respondents were aware of DTCA for at least one of 24 specific medications for cancer treatment or supportive care. The highest awareness levels were for DTCA promoting supportive medications during chemotherapy including Procrit (erythropoietin alfa) for improving red blood cell count and Neulasta (pegfilgrastim) for boosting immune cells. Respondents who were aware of these DTCA had mostly favorable opinions concerning such ads. The majority agreed or somewhat agreed that DTCA made them aware of treatments they did not know (62%), provided information in a balanced manner (65%), and provided information in language they could understand (89%). In contrast, a small minority of these patients felt that DTCA made them less confident in their provider’s judgment (11%), suggesting that it was unlikely that such ads were harmful to most patients' relationships with their physicians. The study was limited to assessing awareness of DTCA for cancer-related prescription medications and the study population was confined to cancer patients diagnosed with either breast or hematologic cancers and receiving treatment at a single institution.

Consumer and Physician Behaviors Associated With DTCA

There is evidence that DTCA is associated with certain consumer communication behaviors including information seeking behaviors and prescription requests from their physicians. In the 2002 FDA survey, 43% of respondents reported that DTCA prompted them to look for more information about the advertised drug or health condition from their healthcare provider, reference books, interpersonal contacts, and the internet (Aikin et al., 2004). In another national survey, about half of the respondents (47%) who indicated they had seen a drug ad that was personally relevant in the past year reported talking about information in the ad during a visit with their doctor (Murray et al., 2004).

In addition, studies indicated physician prescription behaviors are altered when consumers request certain advertised prescriptions. In the survey by Murray et al. (2004), among respondents who discussed information from a drug ad with their physicians, 29% reported they were prescribed the medication mentioned in the ad. In a randomized controlled trial, Kravitz et al. (2005) found physicians were more likely to prescribe anti-depressants when standardized patient actors made a general request for medications or a brand-specific request than when no such requests were made. These associations were present when standardized patients actors portrayed major depression symptoms (for which treatment is indicated) as well as when actors portrayed adjustment disorders with depressed mood (for which treatment is not indicated). Based on these findings, the authors concluded that patient requests have a profound impact on physician prescribing patterns for these mental health conditions in opposing directions—potentially improving care by reducing under treatment of major depression while worsening care by overuse of antidepressants in adjustment disorders.

Currently, there is limited research that focuses on patient and physician behavior with regards to cancer-related DTCA for medications, healthcare providers, or hospital facilities. In the study by Abel et al. (2009) described earlier, only a small proportion of cancer patients (17%) who were aware of DTCA reported they discussed an advertised treatment with their physicians. Of these patients who discussed DTCA with their physicians, about one in five (19%) reported receiving a prescription for the medication while 62% were told by their physicians that they did not need the medication. The proportion of patients who received the medication was comparatively lower than those described above in the national survey by Murray et al. (2004) related to DTCA in general and prescription behaviors. Further research is needed in this area to assess whether cancer-related DTCA may be associated with patient communication behaviors (e.g., information seeking about their condition, requests for prescriptions, or requests for referrals to other hospitals) and physician behaviors.

Summary

This chapter provided a brief introduction to the controversy surrounding the practice of DTCA and the rationale for focusing the dissertation research on cancer-related DTCA. Through a brief outline of historical regulatory events and a review of selected literature on patient awareness, opinions, and behaviors associated with DTCA, I identified several knowledge gaps in the research on cancer-related DTCA that this dissertation aimed to address. The next chapter will outline relevant theoretical frameworks that guided the design of this dissertation project.

Chapter 2 THEORETICAL FRAMEWORK

There are many potential positive or adverse effects of DTCA on patient and physician behaviors, healthcare utilization and outcomes. The subject of this research is an important one among these possible effects—whether DTCA motivates patients to engage in additional health information seeking from their healthcare providers or from other sources. In this dissertation, the studies are guided by theoretical concepts relevant to DTCA effects on health information seeking behavior. These concepts are derived from psychosocial theories of predicting behavior including the Integrative Model of Behavioral Prediction and Social Cognitive Theory, the framework of patient-centered communication in cancer care, and the Structural Influence Model of Communication. These key theoretical concepts are briefly outlined below and integrated into the subsequent chapters describing each study in this dissertation research.

Integrative Model of Behavioral Prediction

The Integrative Model (IM) offers a theoretical framework to situate the present research in studying the relationships between cancer-related DTCA exposure and patient communication behaviors. Broadly, the IM specifies a causal pathway between one’s intention to perform a behavior and the actual engagement in the behavior. The IM further theorizes that behavioral intention is influenced by individuals’ underlying attitudes toward the specific behavior, perceived normative pressure (PNP) to perform the behavior, and perceived behavioral control (PBC) associated with enacting the behavior. Intention is operationalized as an individual’s self-reported likelihood of performing a behavior in a future timeframe. Intention is further defined in terms of specific time, action, context, and target to be compatible with the behavior of interest. Attitude toward the behavior is defined as “degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question” (Ajzen, 1991, p.188) (i.e., whether performing the behavior would be good or bad for oneself, beneficial or harmful, wise or foolish). PNP is a person’s “perceived social pressure to perform or not to perform the behavior” (Ajzen, 1991, p.188) or whether important others think one should or should not perform the behavior and whether others who are similar are also performing the behavior. PBC refers to “people’s perception of the ease or difficulty of performing the behavior of interest” (Ajzen, 1991, p183), that is whether someone believes that he or she would have the ability to perform the behavior and that it would be under his or her control to engage in the behavior.

Applying the above IM constructs to the dissertation research, Study 3 explores the theoretical pathways between exposure to DTCA and patients’ active cancer-related health information seeking, mediated through individuals’ attitudes, PNP, and PBC associated with actively seeking information behaviors. DTCA exposure is hypothesized to influence these IM constructs in a few ways. For instance, spokespersons featured in DTCA may serve as models to actively engage with their physicians to talk about their health condition. These portrayals of patient-doctor discussions convey positive outcome expectations about the information seeking that are associated with positive attitudes toward the behavior. They may also influence perceived descriptive norms that other patients are likely to consult their doctor for information. DTCA may improve behavioral control through observing spokespersons enacting discussions effectively and information aimed at empowering patients' ability to discuss with their doctor about their condition. For instance, in an ad for Detrol LA (indicated for overactive bladder symptoms), a spokesperson promoted a website that provided tips on how patients can get the discussion started with their physician about their symptoms.

At present, there is a lack of empirical evidence that is directly relevant for this dissertation research regarding the psychosocial mediators of DTCA effects on general health information seeking; prior studies focused on specific drug inquiry as the behavioral outcome (Deshpande, Menon, Perri III, & Zinkhan, 2004; Herzenstein, Misra, & Posavac, 2004; Liu, Doucette, Farris, & Nayakankuppam, 2005; Welch Cline & Young, 2004; H. N. Young, Lipowski, & Welch Cline, 2005; H. N. Young & Welch Cline, 2005). Despite this, seeking information about an advertised treatment may be considered as a subset of general health information seeking. Therefore, findings from studies that examined pathways of DTCA effects on drug inquiry behaviors may still inform the generation of hypotheses pertaining to similar theoretical mechanisms of DTCA effects on general health information seeking. In one study utilizing the Theory of Planned Behavior and Self-Efficacy Theory, Liu and colleagues (2005) found that attitudes and subjective norms toward seeking drug information from physicians and pharmacists predicted intentions to seek from these sources among a sample of patients with osteoarthritis who were recently exposed to DTCA for osteoarthritis prescription medications. In contrast, only attitudes toward seeking drug information from the internet predicted intention to seek from the internet. Perceived difficulty was not predictive of intentions to seek from all three sources.

Social Cognitive Theory

Social Cognitive Theory (SCT) provides another theoretical framework to understand the psychosocial determinants of health behaviors (Bandura, 1986). SCT posits that core determinants of behavior include: 1) knowledge of the risks and benefits of health behaviors, 2) perceived self-efficacy of one’s control over performance of health behaviors, 3) outcome expectancies or beliefs about the likelihood and value of enacting certain behaviors, 4) health goals, 5) perceived facilitators, and 6) social and structural impediments to behavior change (Bandura, 2004). Other key concepts from SCT are reciprocal determinism (defined as a triadic model in which behavior, personal factors, and environmental factors interact as determinants of one another) and observational learning of new behaviors through exposure in the media or peer modeling (McAlister, Perry, & Parcel, 2008). Of these theoretical constructs in SCT, three key concepts that are relevant for Study 3 in this dissertation research are observational learning, outcome expectancies, and self-efficacy.

Observational learning or vicarious learning is a central concept of SCT (Bandura, 1986) which refers to the process of “learning to perform new behaviors by exposure to interpersonal or media displays of them, particularly through peer modeling” (McAlister et al., 2008). According to Bandura, there are four key processes underlying observational learning: 1) attention to the modeled behavior, 2) retention of an observed behavior, 3) production of the behavior, and 4) motivation to imitate the modeled behavior (Bandura, 1986). For DTCA to influence observational learning of the desired behavior (e.g., interacting with physicians, requesting the treatment, or finding out more information about an advertised treatment), ads must first attract patients’ attention, ensure retention of information from the ad, guide patients to produce the desired behavior through peer modeling, and motivate them to enact the behavior by generating positive outcome expectancies.

Outcome expectancies are defined as “beliefs about the likelihood of various outcomes that might result from the behaviors that a person might choose to perform, and the perceived value of those outcomes” (McAlister et al., 2008). The concept of outcome expectancy is not unique to SCT and corresponds closely to similar constructs described in other influential behavioral theories including the IM in the earlier section (Fishbein & Ajzen, 2010) and the Health Belief Model (Champion & Skinner, 2008). The underlying premise of the importance of outcome expectancies in predicting behavior is the notion that consumers act rationally to maximize benefits and minimize costs. Therefore, consumers would be more likely to undertake a specific behavior if they believe doing so would provide more rewards or have least amount of costs. Relating this to DTCA, beliefs about positive outcomes associated with discussing an advertised treatment with physicians or with receiving the treatment may motivate patients to discuss information from an ad or request for the advertised treatment.

Self-efficacy is another central concept of SCT widely incorporated in behavioral change communication and interventions. The concept refers to “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986) and is found to be a predictor of health behaviors directly or indirectly across different domains (Gwaltney, Metrik, Kahler, & Shiffman, 2009; Holden, 1991; Strecher, McEvoy DeVellis, Becker, & Rosenstock, 1986). Consistent with the concept of self-efficacy and its impact on health behaviors, advocates claim DTCA plays a role in encouraging patient autonomy and participation in medical decision making through raising awareness about therapeutic choices, promoting information seeking, and reaching autonomous decision choices (Calfee, 2002; Holmer, 1999; Zachry III & Ginsburg, 2001). It should be noted that self-efficacy as described in SCT corresponds closely to perceived behavioral control, which is a core construct in the IM.

In the context of research on DTCA, the above SCT concepts offer meaningful theoretical mechanisms for expecting and explaining effects of advertising on cancer patients' cognitions and behaviors. For instance, in a series of content analyses employing SCT concepts to examine the visual and textual elements of DTCA in print magazines, researchers found DTCA contains various characteristics frequently associating positive outcome expectancies with the use of advertised drugs (Welch Cline & Young, 2004; H. N. Young & Welch Cline, 2005). These behavioral motivators included portraying rewards in terms of identity, relational, or instrumental benefits associated with using an advertised drug. Survey research among young female consumers suggested positive outcome expectancies of discussing about an advertised drug with their physicians were associated with increased intention to communicate with physicians about the drug (H. N. Young et al., 2005). Through the perspective of observational learning, one of the studies examined the role of models in DTCA and reported the majority of DTCA depicted models who possessed positive characteristics (e.g., being healthy, active, and friendly) (Welch Cline & Young, 2004). The authors concluded portraying models whom consumers could identify with and desired to emulate might facilitate consumers' observational learning to modify interactions with their physicians and to discuss about an advertised drug.

Framework for Patient-Centered Communication in Cancer Care

Cancer patients have a wide variety of information needs related to their condition and frequently seek information from various sources to meet their needs (Hesse, Arora, Burke Beckjord, & Finney Rutten, 2008; Nagler, Gray, et al., 2010; Rutten et al., 2005; Squiers, Finney Rutten, Treiman, Bright, & Hesse, 2005). Studies consistently find that most cancer patients turn to their clinicians when they are looking for cancer information (Hesse et al., 2008; Lewis et al., 2009; Rutten et al., 2005). Accordingly, effective patient-clinician communication constitutes an important element of information acquisition by cancer patients and plays a critical role in influencing patient health outcomes (Epstein & Street Jr., 2007; Street Jr., Makoul, Arora, & Epstein, 2009).

The framework for patient-centered communication offers a model for understanding the pathways through which patient-clinician communication may lead to better health outcomes (Street Jr. et al., 2009). First, core communication functions (e.g., information exchange, responding to emotions, making decisions, and enabling self-management) may have direct influences on health outcomes including survival, emotional well-being, or symptom control. In addition, communication may indirectly influence health outcomes through proximal outcomes (e.g., patient knowledge and understanding, satisfaction, and trust in clinicians) or intermediate outcomes such as access to care, quality medical decisions, and self-care skills. Street and colleagues (2007, 2009) proposed seven pathways through which communication could contribute to improved health: 1) facilitate access to needed care, 2) increase patient knowledge and shared understanding, 3) enhance therapeutic alliances (among clinicians, patient, and family), 4) enhance emotional self-management, 5) activate social support and advocacy resources, 6) increase quality of medical decisions, and 7) enable patient agency (self-efficacy and empowerment). From the above concepts, I highlight the roles of patient-clinician information exchange as they pertain to Study 3 in this dissertation research.

Patient-clinician information exchange is conceptualized as one of the core functions of patient-clinician communication that could affect patient outcomes (Epstein & Street Jr., 2007). Information exchange refers to the “reciprocal efforts of both clinicians and patients to manage information and achieve, even negotiate, a shared understanding of the medical and personal issues underlying the patient’s health condition” (Street Jr. & Epstein, 2008). For effective information exchange to occur, patients should actively engage with their physicians to elicit more and clearer information. Physicians should concurrently use partnering and supportive forms of communication tailored to the information needs, beliefs, and values of their patients

(Street Jr., Gordon, Ward, Krupat, & Kravitz, 2005; Zandbelt, Smets, Oort, Godfried, & de Haes, 2007).

To frame patient-clinician discussions about DTCA within the concept of information exchange, one scenario would be an actively engaged patient bringing information from a cancer treatment ad to discuss with his or her physician. In the course of the discussion, the physician may respond with supportive information and explanation about benefits and risks associated with the advertised treatment. This exchange of information in turn leads to improved patient understanding and other outcomes. For instance, Martinez et al. (Martinez, Schwartz, Freres, Fraze, & Hornik, 2009) found patient-clinician information engagement about various cancer-related topics—which included discussing information patients had gotten elsewhere—was found to predict increased feelings of being informed and treatment decision satisfaction among cancer survivors. This was corroborated by another study that found almost all cancer patients (96%) who discussed an advertised cancer prescription drug with their physicians were satisfied with the discussion even though most of them did not eventually receive a prescription for the advertised medication (Abel et al., 2009). The findings suggest information exchange about DTCA, in this case initiated by patients, may contribute to intermediate outcomes of patient satisfaction about treatment decisions or about their interactions with clinicians.

Patient knowledge and shared understanding are viewed as intermediate outcomes that could contribute to improved patient health. In order to make informed treatment decisions, patients need to have an understanding of their disease condition as well as effectiveness, risks, and benefits associated with various treatment options (Braddock, Edwards, Hasenberg, Laidley, & Levinson, 1999). Both clinicians and patients play important roles in this process (Charles, Gafni, & Whelan, 1997). Apart from managing the complexity and uncertainty of treatment-related information, clinicians need to consider individual values, needs, and preferences of patients and communicate effectively to come to a shared understanding of the above issues (Street Jr. et al., 2009). Relating the concept of patient knowledge to research on DTCA, patients may obtain—through discussion and information exchange with their treating doctors—a better understanding of whether an advertised treatment is appropriate for their specific condition and attendant risks and benefits involved with the treatment. From this process, patients may experience increased satisfaction about the discussion or treatment decision as described earlier (Abel et al., 2009; Martinez et al., 2009), improved ability to cope with the illness (Hagerty, 2005; Roberts, Cox, Reintgen, Baile, & Gibertini, 1994), and more commitment to the treatment plan (Zolnierek & Dimatteo, 2009), all of which may contribute to improved treatment outcomes and patient health.

Alternatively, patient-centered communication may lead to improved patient health outcomes through enhancing patient empowerment and agency. The concept of agency is closely related to PBC described above in the IM and self-efficacy in SCT and encompasses patient perceptions and skills across various domains. These skills include the ability to engage actively with clinicians in medical encounters, participate in treatment decision-making, and to perform self-care for everyday health-related activities (O’Hair et al., 2003). Effective patient-clinician communication may facilitate patient involvement in the decision-making process and offer resources for patients to develop specific skills for self-care (Van Dam, Van der Horst, Van den Borne, Ryckman, & Crebolder, 2003). In terms of the role of DTCA in enhancing patient agency, evidence supports the view that these ads may give patients the confidence to talk to their doctors about their concerns, improve discussions with their physicians, and increase feelings of being in control (Abel et al., 2009; Murray et al., 2004).

Structural Influence Model of Communication

The Structural Influence Model of Communication, described by Kontos & Viswanath (2011), suggests disparities in health communication have important roles in mediating relationships between social determinants (e.g., race, education, and income), access to healthcare resources, and more distal health outcomes (e.g., health behaviors, adherence, and treatment outcomes). The underlying assumption for this model is the notion that “control of communication is power and that whoever has the capacity to generate, access, use and distribute information enjoys social power and advantages that accrue from it”. According to the model, communication inequalities that may lead to health outcomes disparities include differences between social groups in terms of their: 1) exposure, 2) attention, 3) external information seeking, and 4) processing of health information. Most relevant to this dissertation research are inequalities in DTCA exposure (Study 2) and external information seeking following DTCA (Study 4).

Applying concepts of Structural Influence Model of Communication to the impact of cancer-related DTCA, Kontos & Viswanath (2011) suggested communication inequalities associated with DTCA may arise at three distinct but related levels: 1) certain groups may be less likely to gain exposure to DTCA, 2) differential attention and processing of DTCA may occur, and 3) some groups may not engage in additional information seeking after viewing DTCA. If such inequalities exist, DTCA may have differential effects between certain social groups. For example, on one hand, if some groups were more likely to be exposed to DTCA or attend to such ads, they may be more aware of treatment options available for their cancers than others. This may widen health outcomes disparities between these groups. On the other hand, detrimental effects of DTCA such as inappropriate use of treatments may affect one group more than others due to communication inequalities at various levels. For instance, it may be that certain social groups are more likely to look for additional information about an advertised treatment and are therefore able to weigh benefits and risks of an advertised treatment better than other groups. Therefore, research is necessary to assess whether certain groups have higher exposure to DTCA than others (Study 2) and whether certain groups are more likely to engage in additional information seeking following DTCA (Study 4).

Summary

Relevant theoretical concepts are adapted from psychosocial models of behavioral change (IM and SCT), patient-centered communication, and the Structural Influence Model of Communication in this dissertation research. Specifically, Study 2 drew on the concepts of communication inequalities in exposure and attention to examine determinants of cancer survivors’ reported exposures to DTCA. In addition, Study 3 assessed the impact of patients’ exposure to DTCA on active information seeking based on the concept of information exchange from patient-centered communication framework and explored the theoretical pathways of this relationship through psychosocial constructs from the IM. Finally, Study 4 explored communication inequalities associated with DTCA by comparing its effects on information seeking behaviors across patients with different characteristics.

Chapter 3 MEASURING EXPOSURE TO DIRECT-TO-CONSUMER ADVERTISING—A VALIDATION STUDY IN THE CONTEXT OF CANCER-RELATED TREATMENT ADVERTISING (STUDY 1)

Abstract

Emerging research suggests that direct-to-consumer advertising (DTCA) may be associated with patient and physician behaviors pertaining to treatment decision making. However, systematic efforts to develop and validate measures of patient exposure to DTCA are lacking. This study evaluated three candidate measures (I-III) of patient-reported exposure to cancer-related DTCA. Using data from two population-based surveys, this study assessed the performance of each measure based on seven criteria. Results were consistent across both surveys; all three measures performed well in terms of convergent, nomological, discriminant, and face validity with a few differences between these measures. Measure I—the briefest of the three measures—posed the lowest level of survey costs and respondent burden among the three measures and was also deployed successfully for mailed and internet-based survey administration. Future directions for application and research relevant for cancer-related DTCA as well as DTCA for other illnesses are discussed.

Introduction

The practice of direct-to-consumer advertising (DTCA) for prescription medications and healthcare services is controversial in the United States and subject to much debate (Bonaccorso & Sturchio, 2002; Fox & Ward, 2008; Frosch et al., 2010; Hoen, 1998; Hollon, 1999, 2005; Holmer, 1999, 2002; E. T. Rosenthal, 2010b). Cancer-related DTCA, a form of "subspecialty DTCA" which is targeted at patients with cancer, is of further concern because of the limited options of highly effective interventions and potentially higher risks associated with specialized treatments (Abel et al., 2007). To better understand the extent of cancer patients' perceptions of cancer-related DTCA—which is defined as "promotional efforts by a pharmaceutical company, healthcare provider, or medical facility to present information about medications, medical devices, or medical services for patients diagnosed with cancer in the lay media environment" (adapted from Wilkes, Bell, & Kravitz, 2000)—and the potential impact of exposure to this advertising on various treatment-related behaviors or outcomes, it is essential to be able to measure patients' exposure to DTCA adequately.

Prior research that formally assessed the validity of exposure measures of cancer-related DTCA or DTCA more generally is lacking. This research presents an approach to validate candidate measures of patients' exposure to DTCA. While the present study pertains to the specific context of cancer treatment advertising, this approach would also benefit research in DTCA associated with other illnesses because of the similarity in the conceptual issues faced by measuring DTCA exposures. I first begin with a brief review of the rationale for this study and conceptual issues related to measuring cancer-related

DTCA exposure. Next, validation criteria and methods are outlined, followed by findings from two population-based surveys. Finally, I discuss the implications of the findings and recommendations for further research.

Rationale for study and conceptual issues of measuring cancer-related DTCA exposure

The impetus for this present validation research stemmed from a need to assess the reliability and validity of existing survey items of cancer-related DTCA exposure that were to be used in the analyses reported in subsequent chapters. These exposure items were part of a survey among a sample of cancer patients in Pennsylvania (to be described shortly). Participants were asked, “Since your diagnosis, how often have you seen or heard advertisements concerning each of the following?” for three categories of ads including “treatment alternatives for your cancer”, “dealing with side effects of treatment”, and “hospitals or doctors offering services for cancer”. Responses were measured along a 5-point scale (1 = Never to 5 = Almost every day). Lower scores represented lower frequencies of exposure to these types of ads (see Appendix A).

These three survey items are conceptually novel compared to exposure measures of DTCA described in the literature and encompass a few measurement limitations. First, the individual items focus on three broad categories of treatment ads that differ topically from measures in previous literature. These prior studies on DTCA exposure overwhelmingly focused on measuring exposure to prescription drug ads alone (Abel et al., 2009; Aikin et al., 2004; Bell, Kravitz, et al., 1999; Deshpande et al., 2004; Frosch, May, Tietbohl, & Pagán, 2011; Martinez & Lewis, 2009; Murray et al., 2004; Sumpradit, Fors, & McCormick, 2002; Weissman et al., 2003; Wilkes et al., 2000). Second, the survey items in our study are brief and do not elaborate with examples or define the individual categories of ads for the respondents. The concern with this brevity is the inherent assumption that respondents could discriminate among the named categories and report their exposure to ads according to those categories accurately. For instance, on its face, the survey item on the category of "hospitals of doctors offering services for cancer" could conceivably trigger recalling different types of ads in different respondents. In comparison, Abel and colleagues (2009) provided a list of 24 cancer-related brand name medications that appeared in print advertisements to prompt patients' responses about their awareness of ads for each of these medications. Third, the survey items in our research asked respondents about the *frequency* of encountering cancer treatment ads. This contrasts with measures from other studies that only asked about awareness (i.e., whether respondents had seen or heard prescription drug advertisements (yes/no)) (Aikin et al., 2004). Furthermore, the three survey items in our study may be limited by the absence of prompts to recall ad exposure from various sources, potentially leading to under-reporting exposures. They differ from measures used by studies to assess respondents' exposure to prescription drug ads across a variety of sources including television, radio, newspapers or magazines, or on the internet (Aikin et al., 2004; Martinez & Lewis, 2009).

The above conceptual issues motivated a separate survey to assess if modifying the existing cancer-related DTCA survey items to address these issues would improve the ability to measure DTCA exposure more accurately. For instance, the brief instructions in the existing items for how respondents should think about their exposure to cancer-related DTCA may appear to reduce the face validity of these items. On the other hand, the brevity of these items might be simpler to understand and less confusing among respondents. This concern drove the effort to compare various versions of these survey items to assess whether brevity was in fact lowering the validity of the existing items and to judge the relative usefulness in measuring exposure of different versions across several criteria. In one modified version, survey items include longer verbal descriptions of each of the ad categories and list media sources to prompt respondents about their recall of cancer treatment ads from these sources. For instance, respondents were asked "Sometimes hospitals or doctors advertise their services (radiation therapy, chemotherapy, or comprehensive treatment) for treating patients with cancer. These advertisements may appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet). Since your diagnosis, how often have you seen or heard advertisements concerning <u>hospitals or doctors offering services for cancer</u>?" (Appendix A). Despite these slightly more detailed descriptions, respondents may still not understand the named categories uniformly or distinguish between the categories. In a second set of alternative survey items, I incorporate longer descriptions of each ad category, list various media sources, and further provide two exemplars of ads that are representative of each category to illustrate what the ad categories mean for respondents (Appendices A and B). This separate survey is designed to compare the performance of these modified versions in terms of reliability and validity against the existing measure using various criteria. Essentially, if the existing exposure measure is not substantially different from the modified versions, this would justify retaining the existing measures for investigating the associations between cancer-related DTCA and communication behaviors in the previously mentioned cancer patient survey.

Validation approach

The approach of this study is adapted from related validation frameworks for assessing the performance of alternative measures of exposure to cancer information (Romantan, Hornik, Price, Cappella, & Viswanath, 2008), scanned information exposure (Kelly, Niederdeppe, & Hornik, 2009), and contradictory health messages (Nagler & Hornik, 2012). This study examines how well each of the three candidate measures of cancer-related DTCA exposure performs based on the following seven criteria that are most relevant: 1) convergent validity, 2) nomological validity, 3) discriminant validity, 4) test-retest reliability, 5) face validity, 6) survey costs, and 7) respondent burden. These criteria are explicated further in Table 3.1. To assess the performance of the candidate measures of exposure to cancer-related DTCA among cancer patients, this research relies on two data sources—the Pennsylvania Cancer Patient Survey and an online survey of cancer patients across the U.S. The methods and findings from these two data sources are described separately, followed by an overall discussion.

Table 3.1 Operationalization of Validation Criteria

Criteria	Definition
Convergent validity	1. Moderate to strong inter-item correlations (Pearson's correlation r ≥ 0.35), 2. Items load on a unidimensional construct, and 3. Internal consistency based on reliability measures (Cronbach's alpha≥0.70).
Nomological validity	1. Correlations between patients' exposure to cancer-related DTCA with variables that would be expected to *predict* cancer-related DTCA exposure as well as those that would be *affected* by exposure to cancer-related DTCA: a. General media usage, b. Health media exposure, c. Scanning of treatment information, and d. Discussing with physicians about information from lay media sources (where cancer-related DTCA would be encountered).
Discriminant validity	1. Candidate measures of cancer-related DTCA exposure would be more strongly associated with one another than with the variables assessed for nomological validity.
Test-retest reliability	1. Correlations between repeated measures of exposure to cancer-related DTCA over time.
Face validity	1. Subjective assessment of the extent that candidate measures accurately reflected the definition of cancer-related DTCA.
Survey costs	1. Length of the measures in terms of word count and 2. Number of responses required.
Respondent cognitive burden	1. Subjective assessment of the extent that measures demanded more cognitive effort to comprehend the instructions of the measures and report their exposure to cancer-related DTCA.

Study 1A—Pennsylvania Cancer Patient Survey

Method

Study Population

Between 2006 and 2008, as part of a larger study, annual surveys were conducted among a probability sample of patients who were diagnosed with breast, prostate, or colorectal cancers and were reported, as legally required, to the Pennsylvanian Cancer Registry (PCR) in 2005. The data collection and survey instrument development procedures are detailed elsewhere (Nagler, Gray, et al., 2010). Survey questionnaires were designed following literature review, extended patient interviews, and expert consultation. The University of Pennsylvania Institutional Review Board approved the study. This present research focuses on the surveys in 2006 and 2007 (Rounds 1 and 2) that collected data about cancer patients’ exposure to cancer-related DTCA. In Round 1, 2013 participants completed the survey (American Association for Public Opinion Research response rate 4 was 64%) (AAPOR, 2006). Among 1758 respondents who agreed to be re-contacted, 1293 (74%) completed the Round 2 survey.

Measures

Cancer-related DTCA exposure (Measure I)

As described earlier, three items asked respondents about their frequency of seeing or hearing about advertisements concerning “treatment alternatives for your cancer”, “dealing with side effects of treatment”, and “hospitals or doctors offering services for cancer”, measured on a 5-point scale (1 = Never to 5 = Almost every day) (see Appendix A). The numerical scores assigned to responses to these three items were treated as interval and averaged to form the measure of cancer-related DTCA exposure (Measure I) (Round 1: *M* = 2.41, *SD* = 1.02; Round 2: *M* = 2.21, *SD* = 0.95).

Health media exposure

Participants’ exposure to health information from media sources is expected to be positively associated with exposure to cancer-related DTCA. Participants reported how frequently they had found out about health information in the preceding 30 days from five media sources (i.e., newspapers or general magazines, medical magazines or newsletters, health segments on television news, television programs other than news, and the internet). Responses for these items ranges on a 4-point scale from ‘not at all’ to ‘two or more times per week’ and were summed into an index of health media exposure (Round 1: *M* = 10.43, *SD* = 3.59; Round 2: *M* = 10.48, *SD* = 3.47).

Scanning about treatment information

Furthermore, encountering cancer treatment information during routine use of media sources is expected to be positively associated with cancer-related DTCA exposure. Respondents were asked “What information have you come across about your cancer from <u>media sources</u> (television, radio, newspapers, magazines, Internet) when you were <u>not looking</u> for it since your diagnosis?” and were able to select if they had come across information about “what treatments were the best for my cancer”, “which doctors of hospitals would be the best for me”, and “how to manage side effects of treatments”.

These binary responses (yes or no) were summed into a 0-5 point index of treatment-related information scanning (Round 1: *M* = 1.05, *SD* = 1.03; Round 2: *M* = 0.56, *SD* = 0.86).

Discussion with treating doctors

Prior research suggests that exposure to prescription drug DTCA prompts patients to discuss the advertised drug with their physicians (Aikin et al., 2004; Murray et al., 2004). Cancer-related DTCA exposure is expected to be associated with discussion with one's physicians about cancer-related information. Four survey items asked if respondents had discussed information they had gotten from media sources (i.e., television or radio; books, brochures, or pamphlets; newspapers or magazines; and internet excluding personal emails) with their treating doctors since the cancer diagnosis. These are media sources through which DTCA for cancer treatments tend to be noticed by cancer patients (Abel et al., 2009). The items were summed into an index (range of 0 – 4) of discussion with treating doctors (Round 1: *M* = 0.78, *SD* = 1.07; Round 2: *M* = 0.59, *SD* = 1.01).

Analyses

Analyses for assessing the performance of Measure I were conducted using the Stata release 11 statistical package (StataCorp, 2009). To assess convergent validity, correlation analyses between Measure I items, computation of the Cronbach's alpha statistic, and principal component analysis were performed. Nomological validity was assessed with correlations between the DTCA exposure scale with health media exposure, scanning about treatment information, and discussion with physicians at Rounds 1 and 2. Using the ‘CORRCI’ command in Stata, I examined discriminant validity by comparing the correlation and its confidence intervals between DTCA exposures in Rounds 1 and 2 against those between the DTCA exposures of each round with the nomological criterion variables. Erring on the side of being conservative, these correlations were deemed to be different if there is no overlap in the confidence intervals. Test-retest reliability was assessed with the correlation between cancer-related DTCA exposures in Rounds 1 and 2.

Results

At Round 1, half of the study sample was female (51%) and the average age was 63 years. Other participant characteristics are reported in Table 3.2. The distributions (mean and standard deviation) of individual Measure I items in both rounds and the resulting DTCA exposure scales are summarized in Table 3.3.

Table 3.2 Participant Characteristics

	Study 1A N=2013			Study 1B N=363		
Characteristics	*M*	*SD*	%	*M*	*SD*	%
Age	66	12		53	16	
Gender – Female			51			52
Education						
Some high school and below			16			2
High school			41			23
Some college or two-year degree			22			36
4-year college degree or higher			22			39
Race/ ethnicity						
White			83			89
Black			13			6
Other			4			6
Cancer type						
Colon cancer			34			10
Breast cancer			34			21
Prostate cancer			32			16
Other			0			43[a]

Note. [a]Examples of other cancer diagnoses were skin cancers (12%), endometrial cancer (4%), lymphoma (3%), and leukemia (3%).

Table 3.3 Distributions of Items and Scales of Candidate Measures of cancer-related DTCA Exposure

	Study 1A				Study 1B					
	Measure I Round 1[a] N=2013		Measure I Round 2[b] N=1293		Measure I N=363		Measure II N=216		Measure III N=147	
Individual Items	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Treatment alternatives	2.22	1.23	2.04	1.15	2.61	1.51	2.64	1.44	2.74	1.47
Dealing with side-effects	2.22	1.30	1.92	1.10	2.45	1.43	2.60	1.37	2.48	1.41
Hospital or doctors offering services	2.87	1.34	2.75	1.33	3.24	1.36	3.26	1.37	3.27	1.31
Combined scale										
Cancer-related DTCA exposure	2.41	1.02	2.21	0.95	2.77	1.22	2.83	1.19	2.83	1.14

Note. Means are based on a five-point scale (1 = Never and 5 = Almost everyday).

[a] The number of cases with missing values for the individual items ranged from 519 to 597; these were predominantly due to 369 cases who were randomized to receive a shortened form of the questionnaire in Round 1 that excluded these cancer-related DTCA items. The remainder was due to item non-response or multiple responses to an item.

[b] The number of cases with missing values for the individual items ranged from 129 to 211 in Round 2; these were due to item non-response or multiple responses to an item.

Convergent validity—In this study population, Measure I items are moderately correlated with one another (inter-item Pearson's r ranged from 0.420 to 0.477 in Round 1 and from 0.461 to 0.474 in Round 2) (Table 3.4). In addition, the three items demonstrate reasonable internal consistency (Cronbach's alpha=0.724 in Round 1 and 0.742 in Round 2). Principal component analyses show that the items load on a single component with an eigenvalue greater than one in both Rounds 1 and 2, accounting for 64% and 66% of the total variances respectively.

Table 3.4 Inter-Item Pearson's Correlations Between Measure I Items (Study 1A)

	Round 1			Round 2		
	1	2	3	1	2	3
1. Ads concerning treatment alternatives for cancer	-	0.420	0.420	-	0.474	0.465
2. Ads concerning dealing with side effects of treatment		-	0.477		-	0.461
3. Ads concerning hospitals or doctors offering services for cancer			-			-
Cronbach's alpha			0.724			0.742

Note. All *P*s <.0005.

Nomological validity—The DTCA exposure scale derived using Measure I items is correlated with health media exposure and information scanning about cancer treatment from media sources in both Rounds 1 and 2. The DTCA exposure scale is also correlated with discussion with physicians about information from lay media sources across both Rounds 1 and 2 (Table 3.5).

Test-retest reliability—The correlation of DTCA exposure scales between the two rounds is moderate (Pearson's r = .492) (Table 3.5).

Discriminant validity—Based on the results in Table 3.5, the association between DTCA scales in Rounds 1 and 2 is stronger than the correlations of each of these scales with the nomological criterion variables (no overlap of the confidence intervals). This supports the inference that the DTCA exposure scale may be a distinct measure comparing with these variables.

Table 3.5 Pearson’s Correlations Between Cancer-Related DTCA Exposure Scale and Health Media Exposure, Scanning for Treatment Information, and Discussion with Physicians (Study 1A)

	Pearson’s r	95% CI
DTCA exposure in Round 1 by DTCA exposure in Round 2	0.492	0.441 - 0.540
DTCA exposure in Round 1 by Health media exposure Round 1	0.360	0.299 - 0.418
DTCA exposure in Round 1 by Scanning for treatment information in Round 1	0.309	0.246 - 0.369
DTCA exposure in Round 1 by Discuss lay media information with treating doctor in Round 1	0.194	0.127 - 0.258
DTCA exposure in Round 2 by Health media exposure Round 2	0.224	0.158 - 0.287
DTCA exposure in Round 2 by Scanning for treatment information in Round 2	0.270	0.206 - 0.332
DTCA exposure in Round 2 by Discuss lay media information with treating doctor in Round 2	0.179	0.113 - 0.244

Note. All *P*s <.0005

Face validity—As discussed earlier, one limitation associated with the brevity of self-reported exposure items in the Pennsylvanian survey is patients may not be able to distinguish ads with different types of content precisely according to the brief descriptions in the items (i.e., alternative treatments for cancer, hospitals or doctors offering services, or dealing with side-effects of treatment). In addition, the items did not prompt respondents to report coming across DTCA across various media. Therefore, these items may not have accurately captured patients' exposure to DTCA across a variety of media sources (e.g., television, print magazines, billboards, or the internet). Patients' self-reported exposure to DTCA based on these items may consequently underestimate their true exposure. However, the brevity of the items in Measure I could be easier to understand and less prone to confusion among respondents. As I will describe shortly in Study 1B, comparisons with more detailed versions of these items would be valuable in assessing whether the brevity of Measure I affected the performance of this measure in other criteria.

Survey costs and respondent burden—Measure I items consist of 52 words and three distinct responses, suggesting that survey costs would be low to moderate. Although brief, these items are judged to have modest cognitive burden because respondents have to generate a summary estimate of their exposure to classes of DTCA, not just specific ads (i.e., treatment alternatives, dealing with treatment side effects, and hospital or doctors offering services) before giving their response.

To summarize, based on this study among a probability sample of Pennsylvanian patients diagnosed with breast, colorectal, or prostate cancers, Measure I items can be considered as reliable and valid means of assessing exposure to DTCA. These items demonstrate reasonable convergent validity, nomological validity against selected criterion measures, test-retest reliability between repeated measures over time, and discriminant validity. In addition, Measure I items are likely to impose low to moderate survey costs and cognitive burden for participants. However, the trade-off associated with the brevity of these items may be reduced face validity. Another limitation of Study 1A is that the sample consisted of only Pennsylvanian patients diagnosed with three types of cancers. This may limit the generalizability of the validity and reliability of Measure I, although there are no a priori reasons to expect substantial differences in other patient populations with different cancer types. To address these limitations, a second study conducted among a sample of patients diagnosed with different cancers across the U.S. compares Measure I with more detailed alternate measures (II and III).

Study 1B—Online Panel Cancer Patient Survey

Method

Study Population

The data for this study is from a self-administered web-based survey between March and May 2012 among 363 adults who reported they had been diagnosed with cancer; these participants were recruited from an existing national opt-in panel maintained by Survey Sampling International (SSI) comprising persons who had a history of cancer. The criteria for inclusion to the study were having any cancer diagnosis within the past two years (from January 2010 onwards) and being aged 21 years or older. The criterion to include only patients who were recently diagnosed was necessary as it is assumed cancer-related DTCA would be more salient for these patients compared with those who had been diagnosed and treated many years ago. Because prior experience of online surveys indicated an under-representation of male participants, the study utilized quota sampling to ensure approximately half of the study participants would be male. The

University of Pennsylvania IRB approved this validation study as research that qualified for exemption from IRB review.

Measures

Cancer-related DTCA Exposure (Measures I to III)

Measure I items are identical to those described in Study 1A. These items were averaged into a scale of DTCA exposure (M = 2.77, SD = 1.22). All the participants in this study were asked the Measure I items.

Measure II comprises three items that showed respondents descriptions of the content of each category of DTCA (i.e., treatment alternatives, dealing with treatment side-effects, and hospitals or doctors offering services) and two exemplars of DTCA collated from television and print advertising sources. Participants were then asked to recall how frequently they saw each type of ads (Appendices A and B). To illustrate, respondents first read a description for ads about hospitals and doctors. Next, participants viewed two examples representing this category of ads (e.g., one print ad and one video ad showing hospitals and doctors providing cancer treatment services randomly chosen from a pool of four print ads and four video ads respectively). They were then asked how frequently they recalled encountering similar ads about hospitals and doctors offering treatment services since their cancer diagnosis. The three items were averaged into an alternate scale of DTCA exposure (M = 2.83, SD = 1.19). Approximately two-thirds of the study population was randomly assigned to respond to Measure II items.

Measure III is identical to Measure II with the exception that the items do not provide exemplars of ads (see Appendix A). The average of the three Measure III items formed another alternative DTCA exposure scale (*M* = 2.83, *SD* = 1.14). One-third of the study population was randomly assigned to answer Measure II items.

Nomological Criterion Variables

Items for health media exposure (*M* = 11.64, *SD* = 4.82), scanning for treatment information (*M* = 0.93, *SD* = 1.07), and discussion with physicians (*M* = 0.77, *SD* = 1.03) were included in the questionnaire. These measures are identical to those described in Study 1A. In addition, respondents reported on their frequency of use of eight media channels (i.e., newspaper, magazine, national and local news, television programs, radio, email, and the internet) in the past 7 days (between 0 to 7 times). Responses to these items were summed to create an index of general media use (*M* = 36.88, *SD* = 11.52).

Analyses

The validation analyses proceeded in a parallel manner to Study 1A. I first assessed the performance of Measures I to III using the criteria laid out in the earlier section on validation approach except for the test-retest reliability criterion because repeat measures of DTCA exposure using these items were not collected in Study 1B.

In addition, I assessed the threat that respondents assigned to Measure II items reported their exposure to specific exemplars that they viewed rather than their recall of a general class of ads represented by the exemplars. To illustrate, if the mean recall for having seen or heard ads about medications to deal with treatment side-effects varied significantly between participants who were shown an ad for Procrit (erythropoietin alfa) compared to those who were shown an ad for Neulasta (pegfilgrastim), this could signal respondents were not recalling their overall exposure to ads for dealing with treatment side-effects. Instead, respondents may be recalling their exposure to the individual ads that they viewed. To assess this possible threat, I performed one-way ANOVA tests to compare the means of each of the Measure II items with the ad shown as the between subjects factor.

Another concern was the potential threat of ordering effects in the way the candidate measures were presented in the survey. I attempted to minimize this threat by separating Measure I items from Measures II/III items with other survey questions (e.g., nomological criterion measures). I further assessed the potential of ordering effects by randomly assigning half the participants to receive Measure I first while the remainder received Measure II or III first. The above validation analyses were repeated to detect the presence of any substantive differences in the findings due to the order of measures in the questionnaire.

Results

Approximately 52% of the respondents were female and the mean age was 53 years. Other participant characteristics are summarized in Table 3.2. This study population tended to be younger, have higher education levels, and was less ethnically diverse compared to the Pennsylvanian sample of cancer patients in Study 1A.

The distributions (mean and standard deviation) of individual items of Measures I – III and the resulting DTCA exposure scales are summarized in Table 3.3. The means of the corresponding exposure items do not differ appreciably between Measures I – III, leading to a first conclusion that there is no substantial under-reporting of DTCA exposure based on Measure I items compared with Measures II or III.

Convergent validity—In Study 1B, the items in all three candidate measures of DTCA demonstrate moderate to strong inter-item correlations within the respective measures (inter-item Pearson’s r = 0.427 to 0.693). Furthermore, the items in these three measures are internally consistent (Cronbach’s alpha=0.743 to 0.814) (Table 3.6). Principal component analysis extracted one single component with an eigenvalue greater than one in all three measures (accounting for 73%, 71%, and 62% of the total variances in Measures I, II, and III respectively). Additionally, topic-matching items from Measures I and II tend to be more strongly correlated than with non-matching items; a similar pattern is also observed for correlations between matching items from Measures I and III (Table 3.7). The summed DTCA exposure scales derived from Measures I and II are strongly correlated (Pearson’s r = 0.713; 95% CI = 0.641 to 0.773). The scales from Measures I and III are also strongly correlated (Pearson’s r = 0.765; 95% CI = 0.689 to 0.825).

Table 3.6 Inter-Item Pearson’s Correlations Within Alternative Measures of Exposure to Cancer-Related DTCA (Study 1B)

	Measure I			Measure II			Measure III		
	1	2	3	1	2	3	1	2	3
1. Treatment alternatives	-	0.693	0.589	-	0.618	0.585	-	0.556	0.487
2. Dealing with side-effects		-	0.489		-	0.578		-	0.427
3. Hospital or doctors offering services			-			-			-
Cronbach’s alpha			0.813			0.814			0.743

Note. All *P*s <.0005.

Table 3.7 Inter-Item Pearson’s Correlations Between Alternative Measures of Exposure to Cancer-Related DTCA (Study 1B)

Measure I	Measure II			Measure III		
	1	2	3	1	2	3
1 Treatment alternatives	**0.588**	0.498	0.433	**0.718**	0.478	0.449
2 Dealing with side-effects	0.528	**0.583**	0.407	0.563	**0.662**	0.367
3 Hospital or doctors offering services	0.516	0.470	**0.580**	0.594	0.384	**0.640**

Note. All *P*s <.0005. Matching items across measures (in bold) tend to be more strongly correlated than non-matching items.

Nomological validity—The analysis show that all three exposure scales using Measure I-III items are significantly correlated with the nomological criterion variables of general media use, health media exposure, treatment information scanning, and discussion with physicians about cancer information from lay media sources (Pearson's r = 0.298 to 0.632) (Table 3.8).

Table 3.8 Pearson's Correlations Between Cancer-Related DTCA Exposure Measures and Nomological Criterion Measures (Study 1B)

	Measure I		Measure II		Measure III	
	Pearson's r	95% CI	Pearson's r	95% CI	Pearson's r	95% CI
1. General media use	0.298	0.201 - 0.389	0.299	0.173 - 0.416	0.375	0.227 - 0.506
2. Health media exposure	0.632	0.566 - 0.690	0.564	0.465 - 0.649	0.627	0.517 - 0.716
3. Scanning for treatment information	0.510	0.430 - 0.582	0.410	0.293 - 0.515	0.491	0.357 - 0.604
4. Discuss lay media information with treating doctor	0.395	0.305 - 0.479	0.343	0.220 - 0.456	0.373	0.224 - 0.504

Note. All *P*s <.0005.

Discriminant validity—The correlations between Measures I and II DTCA exposure scales and the correlations between Measures I and III exposure scales tend to be stronger compared with the correlations between Measures I-III and the nomological criterion variables. Comparing the confidence intervals of these correlations in Table 3.8, I conclude that the DTCA exposure scales are distinct from general media use, treatment information scanning, and discussion with physicians. However, the confidence intervals of correlations within candidate DTCA exposure measures overlap with those of correlations between these exposure measures and health media exposure.

Face validity—Compared with Measure I, Measure II and III comprise more detailed items that prompt respondents to consider their exposure to DTCA across a variety of media sources and descriptions about each category of ads. Measure II items further provide exemplars of print and video ads. Accordingly, Measures II and III are deemed to have higher face validity compared to Measure I.

Survey costs and respondent burden—As described above, Measure I items consist of 52 words and three distinct responses. In contrast, Measure II items consist of 269 words while Measure III has 161 words, approximately three to five times as many words as Measure I. Both Measure II and III are also judged to have higher levels of cognitive burden on participants than Measure I because of the need to process and recall multiple sources of DTCA exposure that would match the textual descriptions. In the case of Measure II items, the cognitive burden would be the highest because participants would need to generate memories of encountering ads similar to the ad exemplars of each category of DTCA that they viewed.

Based on the ANOVA tests, mean DTCA exposure as reported with Measure II items do not differ significantly among ad exemplars of the three categories of DTCA shown. The eta-squared values for these tests range from 0.002 to 0.015, which further indicate the variance in DTCA exposure explained by the ad exemplars viewed is minimal (Table 3.9). Finally, there is no evidence of systematic ordering effects; comparing the above validation analyses between participants who answered Measure I items first and those who received the Measure I items later, there are no substantive differences. For example, the correlation between Measure 1 and II if Measure I appeared first in the survey (r=0.70) is slightly weaker in comparison to that if Measure II appeared first (r=0.81). Conversely, the correlation between Measures I and III when Measure I appeared first (r=0.83) is slightly stronger than the correlation if Measure III appeared first (r=0.75).

Table 3.9 One-Way Between-Participants Analysis of Variance of Effect of Ads Shown on Measure II Items in Study 1B

Category of ads and specific ads	*M*	*SD*	F(3, 212)	*P*	Eta-squared
Alternative treatment print ads			0.249	0.862	0.004
1. Altoona Regional Radiosurgery (A)	2.50	1.414			
2. Altoona Regional Radiosurgery (B)	2.70	1.488			
3. Las Vegas Cyberknife at Summerlin	2.69	1.342			
4. St. Peter's University Hospital Cyberknife	2.69	1.514			
Alternative treatment video ads			0.148	0.931	0.002
1. Memorial Cancer Institute Cyberknife	2.65	1.507			
2. Fox Chase Cancer Center Minimally Invasive Surgery	2.64	1.471			
3. Novalis TX at St Vincent's Medical Center	2.53	1.424			
4. Phoenix Cyberknife	2.72	1.374			
Treatment side effects print ads			0.463	0.708	0.007
1. Zuplenz (A)	2.46	1.410			
2. Aloxi	2.78	1.388			
3. Zuplenz (B)	2.63	1.369			
4. Zometa	2.56	1.350			
Treatment side effects video ads			0.873	0.456	0.012
1. Neulasta	2.65	1.388			
2. Procrit (A)	2.36	1.266			
3. Procrit (B)	2.77	1.417			
4. Procrit (C)	2.67	1.438			
Doctor and hospital print ads			1.066	0.364	0.015
1. Sylvester Comprehensive Cancer Center (A)	3.12	1.508			
2. Sylvester Comprehensive Cancer Center (B)	3.20	1.265			
3. Sylvester Comprehensive Cancer Center (C)	3.20	1.379			
4. Sylvester Comprehensive Cancer Center (D)	3.56	1.270			
Doctor and hospital video ads			0.150	0.930	0.002
1. UNC Cancer Center	3.16	1.347			
2. Carle Cancer Center	3.33	1.476			
3. Hudson Valley Hospital Center	3.29	1.390			
4. Terrebonne General Medical Center – Mary Bird Perkins Cancer Center	3.28	1.294			

To summarize Study 1B findings, this web-based survey among an opt-in sample of patients across the U.S. diagnosed with a wide variety of cancers compares the performance of three candidate measures of DTCA exposure. Measures I to III display reasonable convergent validity and nomological validity. Discriminant validity is largely supported; discrimination between scales derived from Measures I to III and three out of four criterion variables are significant. Measures II and III are deemed to have higher face validity compared to Measure I. However, Measure I is likely to incur the lowest survey costs and respondent burden.

Discussion

This validation study assesses the performance of three alternative measures of cancer-related DTCA exposure among cancer patients using a comprehensive set of criteria across two distinct study populations. Study 1A involved repeated mailed questionnaires among a probability sample of patients from Pennsylvania who were diagnosed with breast, colorectal, or prostate cancers. In comparison, Study 1B involved a cross-sectional web-based survey among patients who were diagnosed with a variety of cancers across the U.S.

Due to the multiple validity criteria in this research, the findings of the performance of candidate measures of cancer-related DTCA exposure based on Studies 1A and 1B are summarized for comparison in Table 3.10 (adapted from Nagler & Hornik (2012) and Romantan et al. (2008)). Across the criteria of convergent, nomological, and discriminant validity, Measures I-III performed equally well for the most part. All three measures demonstrate adequate levels of convergent validity as evidenced by internal consistency and unidimensionality measures. They are also associated with variables that are likely to predict exposure to DTCA as well as behaviors that may arise from exposure (i.e., discussion with physicians). Discrimination between these measures and other associated measures (e.g., health media exposure and treatment information scanning) is replicated in both Studies 1A and 1B. Measure 1 is further evaluated for test-retest reliability. However, these three measures differ in terms of face validity, survey costs, and respondent burden. Measure 1 had lower face validity compared with the detailed versions of Measures II and III. However, the brevity of Measure I did not appear to affect its performance in other validity criteria when compared to the more detailed measures. Measures II and III are more costly and impose higher cognitive burden on respondents. Strikingly, respondents were able to extrapolate their exposure to categories of DTCA from viewing two exemplars of each ad category using Measure II items; their responses did not suggest they were merely recalling exposure to specific exemplars that they viewed. Weighing these findings across the criteria, Measure I would be appropriate as the first option for eliciting DTCA exposure in either mailed or web-based survey formats. If resources permit and face validity is a priority, Measure III may be an alternative choice. The added advantage of face validity from Measure II (including print and television ad exemplars) should be considered against the disadvantages of cost, participant burden, and limitation to data collection methods requiring audiovisual technologies.

Table 3.10 Summary of Analyses Across Validity Criteria

Candidate Exposure Measures	Convergent validity	Nomological validity	Discriminant validity	Test-retest reliability	Face validity	Survey costs	Respondent burden
Measure I	4	4	3	4	2	4	4
Measure II	4	4	3	n/a	4	1	1
Measure III	4	4	3	n/a	3	3	3

Note. 1 = worst performance; 4 = best performance

The replication of validity testing for Measure I across these two studies and exploration of alternative measures (II and III) in Study 1B provides increased confidence in the performance Measure I to assess DTCA exposure among a diverse population of cancer patients. The representative sample of cancer patients in Study 1A, although from a single state, can be viewed as an improvement from studies that are limited to convenience samples of cancer patients or those that involve patients from a single health system. While the study population in Study 1B is not a representative sample of cancer patients across the U.S., I argue that Study 1B complements the findings from Study 1A through the inclusion of a more diverse population of cancer patients (i.e., broader geographic locations and cancer diagnoses). Moreover, the web-based survey in Study 1B enables testing exposure measures that include audiovisual exemplars of DTCA; this would be precluded by mailed questionnaires or phone interviews. This validation approach involving a combination of study populations, survey designs, and modes of data collection described here may serve as an illustrative example for future research aimed at developing and validating self-reported measures of exposure to DTCA associated with other illnesses.

This study is limited in terms of the narrow context of DTCA promoting cancer-related treatments and health services. Despite an expanded operationalization of DTCA exposure beyond prescription medications only for cancer treatment, it may be argued that the validation findings here may not generalize to measures of exposure to DTCA for other illnesses. Future investigations should consider adapting measures described in this current study for measuring exposure to other disease-specific DTCA and to systematically validate these adapted measures. Although substantial modification may be needed for Measure II because of the content-specific exemplars, Measures I and III may be more easily adapted into survey items that measure exposure to DTCA of other illnesses.

The study is also limited by the reliance on self-reported and closed-ended measures of exposure to cancer-related DTCA. Recall biases are a threat to inferences about whether self-reported DTCA exposure truly reflects participants' past exposure or more likely their *memory* of encoded exposure to such advertising in the media (Southwell, Barmada, Hornik, & Maklan, 2002; Southwell & Langteau, 2011; Southwell, 2005). Consequently, population-level measures of exposures through media market gross rating points of televised health campaign advertising or news reporting have been increasingly implemented as predictors of behaviors instead of individual-level self-reported media exposure measures (Farrelly, Davis, Haviland, Messeri, & Healton, 2005; Hwang & Southwell, 2009; Wakefield et al., 2008). Closed-ended survey questions that specify a particular subject matter may also contain researchers' biases and may miss the content that is most meaningful for the study population compared to open-ended questions that permit more in-depth assessment of exposures that are of most interest to the target population (Clarke & Kline, 1974). Nevertheless, these alternatives to self-reported and closed-ended measures are not without their limitations. For instance, media-market gross rating points represent environmental availability of media messages and therefore reflect the *opportunity* to be exposed to media messages; individuals within the media market may not necessarily be exposed at all (Slater, 2004). Responses to open-ended questions about exposure may reflect one's knowledge about a health topic rather than merely exposure (Salmon, 1986) and are often more costly and complex to collect and analyze (Romantan et al., 2008) than closed-ended items.

Despite these limitations, this validation study offers novel insights into valid, reliable, and field-tested measures of cancer-related DTCA exposure among cancer patients that have the potential to be adapted for measuring exposure to DTCA of other illnesses. The validation approach encompassing complementary study populations, designs, modes of data collection, and comprehensive criteria may also serve as a model for future research aimed at systematic comparisons of candidate measures of DTCA exposure.

Chapter 4 A STUDY OF THE FREQUENCY AND CORRELATES OF EXPOSURE TO CANCER-RELATED DIRECT-TO-CONSUMER ADVERTISING AMONG BREAST, PROSTATE, AND COLORECTAL CANCER PATIENTS (STUDY 2)

Abstract

Cancer-related direct-to-consumer advertising (DTCA) is controversial because cancer treatment is complex and entails more risks and costs than typical treatments that are advertised for other conditions. Contributing to the growing research on DTCA, this study describes the prevalence and correlates of cancer patients' frequency of DTCA exposure. A sample of 2013 patients diagnosed with breast, prostate, or colorectal cancers and reported to the Pennsylvania Cancer Registry in 2005 responded to a mailed questionnaire. Three survey items assessed patients' frequency of encountering ads concerning treatment alternatives for cancer, dealing with side effects of treatment, and doctors or hospitals offering services for cancer following their diagnosis. These items were summed to form the overall exposure DTCA measure. Descriptive and multivariate analyses were performed. Overall exposure to DTCA in the sample was modest (median was once per week). Breast cancer patients reported significantly higher overall exposures to DTCA than prostate and colorectal cancer patients (all *P*s<0.0005). Older patients consistently reported lower overall exposure to DTCA across the three cancer types. Other significant correlates included ethnicity (higher exposures among African-American prostate cancer patients vs. white; lower exposures in Hispanic colorectal cancer patients vs. white), and cancer stage (higher exposures in stage IV prostate cancer

patients vs. stages 0-II). Disparities in exposure to DTCA are present based on age, ethnicity and cancer stage and have important implications on clinical and regulatory practice in cancer care.

Introduction

Direct-to-consumer advertising (DTCA) of medical treatments remains highly controversial and generates intense debate between proponents and critics of the value (or detrimental effect) of such promotional efforts (Bonaccorso & Sturchio, 2002; Mintzes, 2002). Extending from this broader debate, DTCA for cancer-related products and services has attracted an increasing level of scrutiny and attention from researchers and practitioners involved in cancer care and survivorship. Special considerations about the appropriateness of DTCA in oncology arise because of the highly specialized nature of cancer diagnosis and treatment compared to other disease conditions, potential risks of cancer-related medications or services, costs involved in cancer care, and possible widening of communication disparities (Bloss, Darst, Topol, & Schork, 2011; Gollust, Hull, & Wilfond, 2002; Kontos & Viswanath, 2011; Lippi, Favaloro, & Plebani, 2011; Lovett, Liang, & Mackey, 2012; Lovett & Liang, 2011).

In a recent review, Gray and Abel classified the rapidly diversifying types of consumer marketing in oncology into DTCA for cancer-related medications, cancer facilities, imaging services, genetic tests, and cancer screening or surveillance tests (Gray & Abel, 2012). This provides a useful overview of the spectrum of DTCA of products and services for cancer screening, diagnosis, treatment, and follow-up surveillance. While research is accumulating on specific forms of DTCA (e.g., prescription medications, high technology imaging services, and genetic testing) (Abel et al., 2007; Finney Rutten, Gollust, Naveed, & Moser, 2012; Illes et al., 2004), information about the extent of DTCA promoting cancer facilities appears to be lacking in the literature. Furthermore, although several studies have described the content of DTCA for cancer-related products and services (Abel et al., 2007; Illes et al., 2004; Lachance, Erby, Ford, Allen, & Kaphingst, 2010; Larson et al., 2005; Lovett et al., 2012), less research has been conducted on how frequently the public at large or cancer patients were exposed to such DTCA (Abel et al., 2009; Finney Rutten et al., 2012).

This present study aims to contribute to the apparent gap in the literature by describing cancer patients' frequency of exposure to types of DTCA in oncology using data from a population-based survey. In this article, cancer-related DTCA (DTCA) is broadly defined as "promotional efforts by a pharmaceutical company, healthcare provider, or medical facility to present information about treatments for patients diagnosed with cancer in the lay media environment" (Wilkes et al., 2000). Recognizing that different patients may have varying experiences, the study compares DTCA exposures between patients diagnosed with breast, prostate, and colorectal cancer and explores whether individual patient characteristics are correlated with advertising exposures. The findings in this study would generate much needed evidence on the frequency of exposures to DTCA among cancer patients, identify potential areas of communication disparities, and inform clinical and regulatory practice.

Method

Study Population

This study relied on survey data from patients who were diagnosed with breast, prostate, or colorectal cancers and whose names were sent to the Pennsylvanian Cancer

Registry in 2005. Patients with these three cancer types were randomly selected to participate in the survey in September 2006, approximately 9 to 21 months after their initial diagnoses. After the initial data collection, an oversample among patients diagnosed with colorectal cancer, those with Stage IV disease, and African American patients was added to increase sample sizes for subgroup analyses. Overall, 679 breast cancer patients, 650 prostate cancer patients, and 684 colorectal cancer patients completed the survey. The American Association for Public Opinion Research response rates (AAPOR RR#4) (The American Association for Public Opinion Research, 2006) for breast, prostate, and colorectal cancer patients were 68%, 64%, and 61% respectively. The survey questionnaire was designed following literature review, patient interviews, and expert consultation. These questionnaires were mailed to participants based on Dillman's procedure for mail surveys (Dillman & Dillman, 2000). Further details of the data collection and survey instrument development procedures are described fully elsewhere (Nagler, Gray, et al., 2010). The university's institutional review board approved the study.

Measures

Exposure to DTCA was operationalized as patients' self-reported frequency of encountering three different types of ads since their cancer diagnosis: 1) treatment alternatives for cancer, 2) drugs for dealing with side effects of treatment, and 3) hospitals or doctors offering services for cancer. Responses for each survey item ranged along a 5-level scale (never, less than every month, about twice a month, about once a week, almost every day). To allow easier interpretation of these response options in the descriptive analyses, each response choice was recoded to represent the frequency of encountering the aforementioned ads per week (i.e., 0, 0.2, 0.5, 1, and 7 respectively). An overall exposure to DTCA was computed by adding participants' responses to the three survey items (ranging from 0 to 21). Of the 2013 participants, 369 were not asked these questions on DTCA exposure because they randomly received a short version of the questionnaire with fewer items as part of another study (Kelly, Fraze, & Hornik, 2010). An additional 150 to 228 respondents for each of the three DTCA exposure items were missing because of item non-response. Therefore, data on overall DTCA exposure was available for 1505 or 75% of the initial sample.

Potential predictor variables of exposure to DTCA were participants' age, sex, ethnicity, education, marital status, and AJCC/UICC stage of cancer at diagnosis (Greene, American Joint Committee on Cancer, & American Cancer Society, 2002) (derived from cancer registry data). Of the 2013 participants, missing values for predictor variables ranged from 3 to 132 cases due to item non-response or insufficient information for cancer staging in the registry. All participants were included in the analyses described below.

Analyses

Descriptive analyses were performed using SPSS version 20.0 (IBM Corp, 2011) to describe the distributions of frequency of exposure to each category of ads and the overall frequency of exposure to DTCA across the three cancer types. Initial analyses showed that these variables were not normally distributed (skewness ranged from 2.05 to

3.61; kurtosis ranged from 2.40 to 11.74; all univariate Shapiro-Wilk tests were significant at $p < 0.0005$). Pairwise comparisons of exposure to each category of ads and overall exposure to DTCA between cancer types were performed with the Kruskal-Wallis tests corrected for Type I errors using the Bonferroni approach. Multivariate analyses were performed using the Mplus software (Muthén & Muthén, 1998) to fit full information maximum likelihood (FIML) models predicting the overall exposure to DTCA within each cancer type. Research has demonstrated that the FIML technique is superior to ad hoc methods for dealing with missing data in predictor variables (e.g., listwise deletion, pairwise deletion, mean imputation) and has the benefits of reducing bias and sampling variability in multiple regression models (Enders & Bandalos, 2001; Enders, 2001). Huber-White covariance adjustments were applied to the estimated standard errors as these are robust to non-normality in the data. The models applied post-stratification sample weights to adjust the final sample to represent the patient population from the cancer registry in terms of race, age, gender, marital status, time of diagnosis, and stage at diagnosis; adjust for survey non-response; and account for the oversampling of certain subgroups of patients.

Results

Table 4.1 summarizes the characteristics of the overall sample and patients within each cancer type. Overall, the average age of the sample was 66 years, half was female, 44% had some college education or higher, 83% were white, 67% were married, and 71% had early stage cancer (stages 0 to II). Approximately equal numbers of patients from each of cancer type were represented in the sample. Additional details by cancer type are available in Table 4.1.

Table 4.1 Demographic Characteristics Of Study Participants By Cancer Type

	All patients (n=2013) % or *M* (SD)	Breast (n=679) % or *M* (SD)	Prostate (n=650) % or *M* (SD)	Colorectal (n=684) % or *M* (SD)
Age at diagnosis (years)[a]	66.1 (12.4)	60.8 (13.4)	66.9 (9.6)	66.6 (12.6)
Female[a]	50.9	100.0	0.0	50.6
Education level[b]				
High school and lower	56.5	53.9	53.0	62.6
Some college and higher	43.5	46.1	47.0	37.4
Race				
White	83.1	83.1	80.5	85.5
African-American	12.8	12.8	15.2	10.4
Hispanic and other	4.2	4.1	4.3	4.1
Marital status[b]				
Not married	32.9	42.0	21.3	35.0
Married	67.1	58.0	78.7	65.0
Stage of disease[c]				
Stage 0-II	71.0	77.9	77.2	58.0
Stage III	12.9	6.6	6.0	25.9
Stage IV	16.1	15.4	16.8	16.1

Note. [a] 3 missing values.
[b] 34 missing values.
[c] 132 missing values.

Figure 4.1 displays the distribution of overall exposure to DTCA in the study sample. The summary statistics of exposure to each category of ads and overall exposure to DTCA for the study sample and within each cancer type are presented in Table 4.2. The overall reported exposure to DTCA in the sample was modest (*M*=2.6 times per week, *SD*=4.3, median=once per week). However, a small proportion of the sample (16.1%) reported having more substantial exposure to DTCA ads of seven times a week or more. Based on the Kruskal-Wallis test (corrected for Type I errors using the Bonferroni approach), the distribution of overall exposure to DTCA among breast cancer patients was significantly different from those of prostate and colorectal cancer patients (all *p*s<.0005). Several pairwise comparisons of the distributions of exposure to each category of DTCA also showed significant differences across cancer types (all *p*s<.0005). For ads about treatment alternatives, exposure among breast and prostate cancer patients differed from colorectal cancer patients. The exposure to ads about dealing with side effects was significantly different in all pairwise comparisons between these three cancer types. In addition, the distribution of exposure to ads on hospitals or doctors for breast cancer patients differed significantly when compared with those of prostate and colorectal cancer patients.

Figure 4.1 Distribution Of Overall Weekly Exposure To Cancer-Related Direct-To-Consumer Advertising (n=1505)

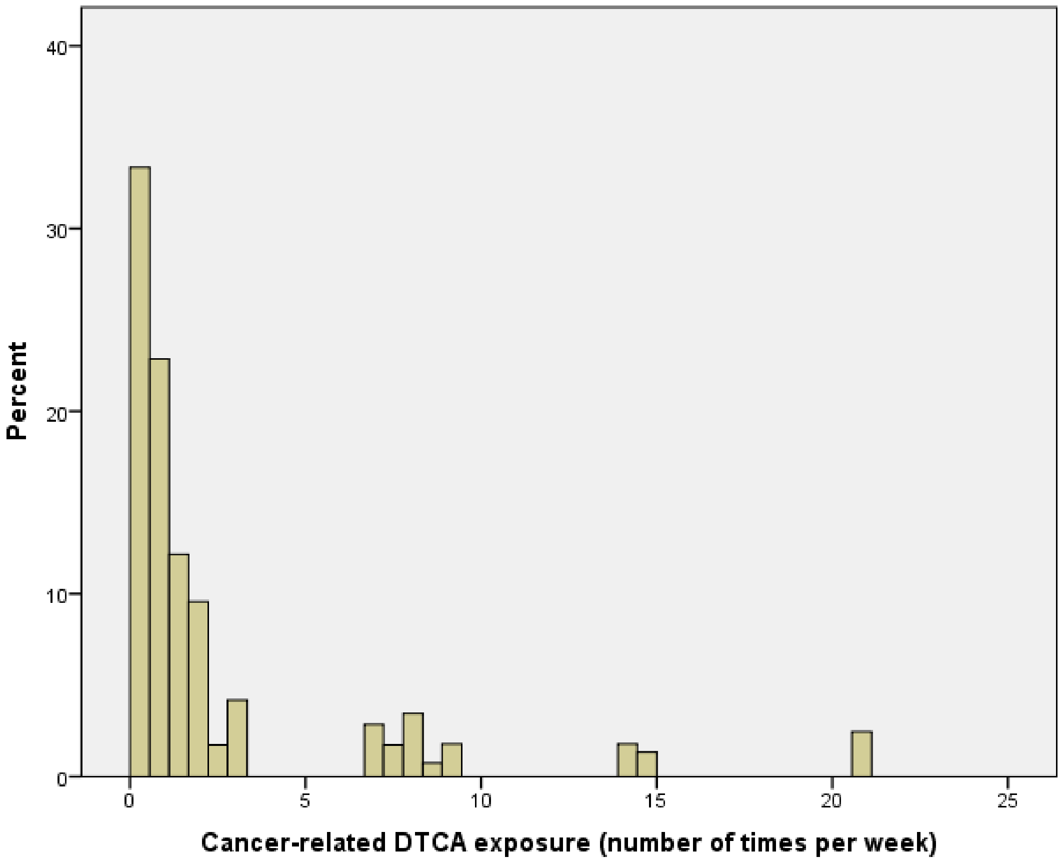


Table 4.2 Distribution Of Weekly Exposure To Cancer-Related Direct-To-Consumer Advertising By Cancer Type

	All patients (n=1505)		Breast (n=511)		Prostate (n=470)		Colorectal (n=524)	
	M (SD)	Median	*M* (SD)	Median	*M* (SD)	Median	*M* (SD)	Median
Treatment alternatives (0 to 7)	0.7 (1.6)	0.2	0.9 (2.0)	0.2	0.5 (1.2)	0.2	0.5 (1.4)	0.2
Dealing with side effects (0 to 7)	0.7 (1.7)	0.2	1.1 (2.1)	0.2	0.4 (1.2)	0.0	0.7 (1.6)	0.2
Hospitals or doctors (0 to 7)	1.3 (2.3)	0.5	1.9 (2.7)	0.5	0.8 (1.7)	0.2	1.2 (2.2)	0.5
Summed exposure (0 to 21)	2.6 (4.3)	1.0	3.7 (5.3)	1.4	1.7 (2.9)	0.7	2.2 (4.1)	0.7

Table 4.3 presents the multivariate models predicting overall DTCA exposure for patients diagnosed with breast, prostate, or colorectal cancers. Older patients consistently reported less frequent overall exposure to DTCA across the three cancer types (decreased frequency of exposure between 0.03 to 0.06 times per week for each additional year in age). Among prostate cancer patients, African-American patients reported encountering DTCA 1.1 times per week more than white patients. Prostate cancer patients with advanced disease (stage IV) reported encountering DTCA 0.9 times per week more than patients with stages 0 to II. Conversely, colorectal cancer patients who identified as Hispanic or other groups reported being exposed to 1 ad/week less than white patients. Across the three cancer types, the explanatory power of these multivariate models was small (R^2 ranged from 3% to 6%).

Table 4.3 Predictors Of Summed Weekly Exposure To DTCA By Cancer Type

	Breast cancer (n=679)				Prostate cancer (n=650)				Colorectal cancer (n=684)			
Predictor variables	B	95% CI			B	95% CI			B	95% CI		
Age at diagnosis (years)	-0.063**	-0.101	-	-0.024	-0.044***	-0.067	-	-0.020	-0.031*	-0.058	-	-0.004
Gender[a] – Female	-				-				0.715	-0.096	-	1.526
Education[b] – Some college and higher	-0.358	-1.419	-	0.702	0.196	-0.258	-	0.649	-0.324	-1.178	-	0.529
Race-ethnicity[c]												
African-American	0.812	-0.774	-	2.398	1.121**	0.281	-	1.960	1.131	-0.222	-	2.483
Hispanic and other	0.521	-2.244	-	3.285	-0.388	-1.217	-	0.442	-1.073*	-1.905	-	-0.241
Marital status[d] – Married	-0.288	-1.491	-	0.916	0.014	-0.596	-	0.625	-0.155	-1.043	-	0.734
Stage of disease[e]												
Stage III	0.002	-2.469	-	2.473	-0.121	-0.836	-	0.594	0.445	-0.501	-	1.391
Stage IV	0.673	-0.620	-	1.965	0.900**	0.261	-	1.539	0.786	-0.638	-	2.209
Intercept	7.629				4.101				3.121			
R-squared	0.031				0.060				0.034			

Notes. B denotes weighted full information maximum likelihood estimates of unstandardized coefficients.
*p<.05; **p<.01; ***p<.001.
[a] Male is the reference category.
[b] High school and lower is the reference category.
[c] White is the reference category
[d] Not married is the reference category
[e] Stage 0 to II is the reference category (because there were no prostate cancer patients with stages 0 or I)

Discussion

In this study population, patients diagnosed with breast, prostate, or colorectal cancers reported modest levels of exposure since their diagnosis to DTCA that concern cancer treatment alternatives, dealing with side effects of treatments, and hospitals or doctors offering cancer treatment services. Median frequency ranged from 0 to 0.5 times per week for each type of ad. The overall exposure to DTCA was correspondingly low (median frequency ranged from 0.7 to 1.4 times per week out of a maximum of 21). This level of reported exposure to DTCA is consistent with an earlier study reporting cancer patients being treated for breast or hematologic malignancies were aware of a small number of advertised cancer medications (median of 3 out of a list of 24 medications advertised in print magazines) (Abel et al., 2009). The low levels of overall exposure observed in this present study further corroborates findings that ad spending for DTCA is generally much lower than DTCA for other conditions (Bell, Kravitz, & Wilkes, 2000; Donohue et al., 2007; Larson et al., 2005; M. B. Rosenthal et al., 2002; Welch Cline & Young, 2004; Wilkes et al., 2000; Woloshin et al., 2001). Although concerns that DTCA may have substantial impact on patient outcomes appear less worrisome given the modest exposures reported in this patient population as a whole, increasing trends of various forms of DTCA in oncology through diverse channels warrant continued monitoring of patient' exposures. Furthermore, this study found that about 16% of the study population reported encountering DTCA seven times per week, which can be considered a substantial amount of exposure for deliberate public health communication. The impact of DTCA on this group of patients deserves careful study.

The analysis shows that patients diagnosed with breast cancer tend to report more frequent DTCA exposure than prostate or colorectal cancer patients. Earlier content analyses found that general DTCA and cancer-related DTCA are more likely to target female audiences or occur in female-oriented print magazines (Abel et al., 2007; Bell, Kravitz, et al., 2000). Therefore, one interpretation of this finding could be female cancer patients are reporting higher DTCA exposures than male cancer patients. However, the multivariate analysis among colorectal cancer patients indicated that gender is not a significant correlate of DTCA exposure, meaning the differences observed in this study is more likely a function of differences between cancer type than of gender-based targeting. Potential reasons could be higher ad spending on breast cancer-specific treatments (e.g., anastrazole for breast cancer in women) leading to variations in cancer patients encountering ads that are most salient for their diagnosis. Future research should consider comparing the extent of cancer-specific DTCA and assessing the potential disparities between patients with various cancer types in terms of patient awareness of approved treatments, patient-provider discussions, and treatment decision-making.

The multivariate analysis of correlates of exposure to DTCA across cancer types suggest that there is little evidence of communication disparities arising from DTCA exposure across several patient characteristics. With the exception of age, the variation in exposure to DTCA was not explained consistently by patient characteristics among patients with the three cancer types. For instance, while older patients consistently report lower exposures across all cancer types, patient ethnicity is correlated to DTCA exposure only among prostate and colorectal cancer patients. The implications for these observed disparities in exposures on patient outcomes are uncertain at this point. Varying recommendations for treatment, availability of safe and effective treatment options, and risk versus benefit considerations for an advertised treatment or service for the different cancer types and stages of disease complicate drawing implications from these disparities. For instance, if an advertised treatment is appropriate based on treatment guidelines, patients who report less exposure to such DTCA might be less aware and less likely to receive this treatment. Conversely, if an advertised service entails greater risks and costs but is no more effective than standard care, patients who have higher ad exposure and pursue this treatment may be harmed.

A recent study by Abel and colleagues in the context of breast cancer treatment offers an example for assessing the implications of disparities in exposures (Abel et al., 2013). The authors reported that overall spending on DTCA for aromatase inhibitors (anastrozole, exemestane, and letrozole) is associated with a small but significant increase in appropriate prescriptions for women diagnosed with breast cancer (i.e., women aged above 60 years) at the population level. Conversely, ad spending is not associated with an increase in inappropriate prescriptions (those for women aged below 40 years) (Abel et al., 2013). If older breast cancer patients are less exposed to DTCA about aromatase inhibitors as might be implied in this present study, the age disparity in exposure could have a meaningful impact on older patients' receipt of such medications. Similar considerations depending on the specific treatment and cancer type and patient subgroup may yield different implications.

There are some limitations in this study. First, the sample is limited to cancer patients within the state of Pennsylvania. It is plausible that interstate variations in DTCA by cancer facilities may occur due to varying levels of competition between local or regional cancer centers. Future research involving a national sample of cancer patients may be necessary to detect if geographical variation in DTCA exposure is present. Second, there are limitations associated with the survey measures of DTCA exposure. Patients had to summarize their encounters of categories of ads and were not asked to recall specific advertised treatments. In contrast, Abel and colleagues measured awareness to specific cancer prescription drugs advertising by listing 24 specific medications that have appeared in print magazines (Abel et al., 2009). Furthermore, the questions asked for recall of exposure to DTCA "since diagnosis" and that ranged between 9 to 21 months prior to their responding. The measures may also be subject to recall bias leading to under-reporting (e.g., if patients fail to recall exposure from over a year ago) or over-reporting (e.g., if patients telescoped their exposure to include non-cancer DTCA or across a longer period of time). Despite these limitations, the validation study in this research (Study 1) offers evidence that the survey items for measuring exposure used here in Study 2 compares favorably with more detailed versions across multiple validity criteria. Still, additional research would be necessary to validate self-reported exposure to DTCA with objective data including ad buys of DTCA on various media channels (television, newspapers or magazines, radio, and internet). Such data on DTCA spending at the aggregate level has been used extensively in prior research on DTCA for cancer and other illnesses (Abel et al., 2013; Bradford et al., 2006; Donohue & Berndt, 2004; Law, Majumdar, & Soumerai, 2008). Third, there may be potential confounders that are not included in these analyses due to constraints of survey length. Future research should incorporate a wider array of predictor variables.

This study is strengthened by a few design characteristics. First, although limited to Pennsylvania, the population-based sample of cancer patients across three cancer types compares favorably to earlier studies conducted with population-based samples who are predominantly healthy and for whom DTCA was not personally salient (Aikin et al., 2004; Bell, Kravitz, et al., 1999; DeLorme, Huh, & Reid, 2006; Deshpande et al., 2004; Finney Rutten et al., 2012; Murray et al., 2004; Sumpradit et al., 2002; Weissman et al., 2003; Wilkes et al., 2000). In addition, this study also represents a more diverse sample of cancer patients when compared to studies that also focused on cancer patients but were limited by convenience samples of patients treated within a single hospital (Abel et al., 2009). Third, the study examines additional categories of DTCA including treatment alternatives and hospitals or doctors offering treatment services. This enables a more comprehensive assessment of cancer patients' exposures to these additional forms of cancer treatment advertising that are increasingly prevalent (American Medical Association, 2006; Jin et al., 2011; Larson et al., 2005; E. T. Rosenthal, 2010a). In contrast, earlier research focused predominantly on DTCA of prescription medications, imaging services, or genetic testing (Abel et al., 2007; Finney Rutten et al., 2012; Illes et al., 2004).

In conclusion, this study finds that frequency of overall exposure to cancer-related DTCA among a population-based sample of cancer patients in Pennsylvania is modest. However, continued monitoring of the content, ad spending, and patient awareness to various types of DTCA is recommended as some patients reported substantial frequency of exposure. There is minimal evidence of major communication disparities in terms of DTCA exposure across several patient characteristics. While patients’ exposure to DTCA differs across cancer types and age, other patient characteristics are not consistently associated with DTCA exposure.

Chapter 5 HOW IS EXPOSURE TO DIRECT-TO-CONSUMER ADVERTISING ASSOCIATED WITH ACTIVE HEALTH INFORMATION SEEKING BEHAVIORS? RESULTS FROM A LONGITUDINAL ANALYSIS AMONG CANCER PATIENTS (STUDY 3)

Abstract

Previous research on the communication impact of exposure to direct-to-consumer advertising (DTCA) of prescription treatments largely focused on patients' inquiry about specific treatments or requests for these prescriptions as outcome behaviors. In contrast, the spillover effect of DTCA exposure on general health information seeking behaviors is less well-studied. The first part of this study examines the effects of exposure to cancer-related DTCA on subsequent health information seeking behaviors from clinician and non-clinician sources among a population-based panel of cancer patients. The analyses indicate that exposure to DTCA is significantly associated with increased levels of patients' subsequent active health information seeking from their clinicians at one year follow-up, controlling for prior seeking behavior and potential confounders. In addition, exposure to DTCA is marginally significant in predicting active health information seeking from non-clinician (lay media and interpersonal) sources. Guided by the Integrative Model of Behavioral Prediction, the second part of this study conducts a focused analysis on psychosocial mechanisms through which DTCA may influence information seeking from non-clinician sources among cancer patients. This analysis shows a significant indirect path between DTCA exposure and subsequent information seeking from non-clinician sources at one year follow-up, mediated through

attitudes and intention toward active information seeking from these sources. Research, practice, and policy implications of this investigation are discussed.

Introduction

The ongoing debate over the benefits and harms of direct-to-consumer advertising (DTCA) of medical treatments has spawned a significant amount of research over the past three decades aimed at dissecting the impact of this unique form of public health communication on patients, healthcare providers, and the broader healthcare ecosystem (for comprehensive reviews of this debate, see Almasi, Stafford, Kravitz, & Mansfield, 2006; Auton, 2004, 2006; Gilbody, Wilson, & Watt, 2005; Harker & Harker, 2007; White, Draves, Soong, & Moore, 2004). From a health communication perspective, this accumulating body of research has accomplished much in terms of piecing together important insights on the content and effects of DTCA on a variety of psychosocial outcomes, communication behaviors, and relationships between patients and their physicians (Aikin et al., 2004; Bell, Kravitz, et al., 1999; Deshpande et al., 2004; Murray et al., 2004). The overall evidence appears to support viewing DTCA as a potentially beneficial communication strategy—if harnessed appropriately to minimize potential harms—that could shift the process of healthcare delivery away from a paternalistic physician-centered model to a more patient-centered model that emphasizes shared decision-making (Almasi et al., 2006; Deshpande et al., 2004; Harker & Harker, 2007). This is echoed in a recent essay by Beltramini (2010, p. 574) summarizing the impact of DTCA research on the field of health communication: "consumers have been empowered with additional information to "level the field" with the health care community, contributing to more efficient doctor-patient exchanges".

How DTCA might empower consumers and “level the field” in terms of health and medical information is the subject of this present inquiry. Despite the large body of DTCA research—a systematic review in 2005 identified 2835 publications on DTCA (Gilbody et al., 2005)—significant gaps remain in two main areas. These include the understanding of implications of DTCA on important communication behaviors among patients and studying theoretically grounded mechanisms for possible effects of DTCA on communication behaviors.

The majority of DTCA communication research focuses on whether DTCA influences patients to inquire specifically about an advertised drug or to request a prescription for the medication from their providers (Aikin et al., 2004; An, 2007; Bell, Wilkes, Kravitz, & others, 1999; Deshpande et al., 2004; Herzenstein et al., 2004; Khanfar, Polen, & Clauson, 2009; A. L. Lee, 2009; Liu et al., 2005; Mendonca, McCaffrey, Banahan, Bentley, & Yang, 2011; Murray et al., 2004). This line of research has important implications for clinical practice because it informs various stakeholders including regulators and health professionals concerned with adverse changes in patient-physician relationships or undue pressure leading to inappropriate prescribing; patients who are exposed to DTCA and receiving prescription treatments they may not need; and advertisers who wish to know if the advertising campaign was effective in generating drug sales.

Largely unstudied is the potentially beneficial spillover effects of DTCA in prompting health information seeking about an advertised treatment *and* about other important information relevant to managing the illness. In economic theory terms, these spillover effects are termed as positive externalities. Some examples of additional seeking include seeking information related to illness prevention, screening and diagnosis for new health symptoms, or non-drug ways to improve health (Calfee, 2002, p.185-186). Notably, this concept of broad-based information seeking across health topics is widely recognized in the field of health communication to be an essential determinant that influences numerous health behaviors and outcomes (e.g., preventive health behaviors, health screening, illness coping, and psychosocial outcomes). The impact of health information seeking has been observed across individual and population levels in various disease contexts including cancer care (Brashers, Goldsmith, & Hsieh, 2002; Cegala et al., 2008; Cline & Haynes, 2001; Czaja, Manfredi, & Price, 2003; Dutta-Bergman, 2004; Finney Rutten, Squiers, & Hesse, 2006; Johnson & Case, 2012; Kelly, Hornik, et al., 2010; Lambert & Loiselle, 2007; J. Niederdeppe et al., 2007; Shim, Kelly, & Hornik, 2006; Tian & Robinson, 2008).

The first part of this present study is an attempt to address these research gaps in DTCA communication research by examining the associations between DTCA exposure and patients' general health information seeking behaviors in a population-based panel of cancer patients (Study 3A). In particular, this analysis centers on two active information seeking behaviors—patient-clinician information engagement and active information seeking from non-clinician sources. The second part of this study (Study 3B) is guided by the Integrative Model of Behavioral Prediction (IM) (Fishbein & Ajzen, 2010; Fishbein & Yzer, 2003; Fishbein, 2000, 2008) and elaborates the findings in Study 3A by exploring potential psychosocial mechanisms for the associations between DTCA exposure and information seeking behaviors from non-clinician sources. The following sections describe the extant literature, research hypotheses, and analyses of these two studies separately. These are followed by a discussion of the overall findings and implications for future research and practice surrounding DTCA and patient communication behaviors.

Study 3A Main Effects of DTCA Exposure on Information Seeking Behaviors

DTCA and Health Information Seeking Behaviors

It is unsurprising to expect DTCA to stimulate information seeking specific to the advertised treatment; after all, that is one of the primary objectives of product advertising. But it is less obvious to expect that DTCA would also influence patients to seek more generally about coping with one's health condition or to search for related information such as prevention and alternative treatment options.

Nonetheless, the idea that DTCA might motivate general health information seeking appears at least plausible for a few reasons. First, ads for prescription treatments are required by the Food and Drug Administration (FDA) guidelines on broadcast DTCA to include "adequate provisions" to refer consumers to doctors and pharmacists for more information as well as detailed product information through a website, toll-free number, and print ads (FDA, 1999, p.326-328). For the most part, to comply with these FDA provisions, DTCA frequently encourages viewers to ask their doctor if an advertised treatment is appropriate for their condition (e.g., "Ask your doctor if XGEVA is right for you to prevent these serious bone problems caused by bone metastases"). More relevant for this research, DTCA may also include more general messages for viewers to ask their doctor about health symptoms and conditions apart from promoting seeking about the medication (e.g., “Quitting isn’t easy; and when willpower isn’t enough, it’s time to talk to your doctor” in an ad for Chantix, a prescription medication for smoking cessation).

Another reason for assuming DTCA’s potential effects on general health information seeking is derived from prior studies that conducted content analyses on a variety of DTCA of prescription drugs. These studies systematically quantified the ubiquitous presence of cues or messages directing patients to look for drug-related information *and* also general health information about the condition from different sources. For instance, Kaphingst and colleagues (2004) analyzed the content of 23 broadcast ads for prescription drugs which were indicated for a variety of illnesses and appeared on national television networks. All 23 ads included statements encouraging viewers to seek for more information from other sources. As expected, the majority of ads directed viewers to look for more information about the advertised drug (20 ads). All the ads contained references to available additional information about the advertised product through print ads (e.g., in consumer magazines), product website addresses, or toll-free telephone numbers. In addition to promoting information seeking about the advertised drugs, over half of the ads (13 ads) were coded as containing broader statements that asked viewers to seek “more information” in general about the health condition without specifying what topics the viewers should seek about. The most common sources of information referred to in these ads were doctors and pharmacists. Another study by Bell and colleagues (Bell, Kravitz, et al., 2000) analyzed 320 unique magazine print ads of 101 brands of prescription medications that were indicated for different illnesses. The researchers coded these ads for the presence of offers for where to get additional information about the drug *or* health condition available in print or audiotape/video form and reported that 35% of these ads (112 ads) contained these offers for more information. In another study, Abel and colleagues (2007) analyzed 49 unique magazine print ads for 22 cancer-related medications. In contrast to Bell et al. (Bell, Kravitz, et al., 2000), they found that 84% of these cancer-related ads (41 ads) mentioned where to get more information about the advertised drug and about the condition more generally, most frequently through a web site. These latter two studies were limited by the coding for the inducements for additional information as it was not possible to distinguish between ads offering additional sites for more information about the medication only from those that also offered information about the health condition more generally. Admittedly, evidence from DTCA content analyses cannot establish whether patients would perceive these vague inducements to be encouraging them to seek more broadly about their illness.

In the course of searching for specific information about an advertised drug, patients may also be inclined to search for overlapping health information relevant for their health condition. Evidence from national consumer surveys partially supports the notion that DTCA would prompt patients to seek more general information about their health condition and treatment from their healthcare provider or other information channels. National surveys conducted by the U.S. Food and Drug Administration (FDA) indicated most consumers agreed that DTCA increased their awareness of new drugs

(77%) (Aikin et al., 2004, p.3). A sizable proportion of consumers (43%) reported DTCA prompted them to look for more information about the advertised drug *and also* about their health condition from their healthcare provider, reference books, interpersonal contacts, and the internet (Aikin et al., 2004, p.2). Correspondingly, Weissman and colleagues (2003) surveyed a national U.S. sample of 3000 adults and found that one in three (35%) respondents reported a prescription drug ad had previously prompted them to have a discussion about the advertised drug, a new health concern, or a possible change in treatment for an existing illness with their physician. The above survey items were limited by the inability to distinguish between being prompted to seek information about the advertised drug alone, seeking about one's health condition alone, or seeking about both topics. Therefore it is unclear what proportion of respondents agreed that DTCAs prompted broader searches about the condition in general.

Other studies among convenience patient samples added tentative support to the expectation of spillover informational effects of DTCA. In one study, Abel and colleagues (2009) surveyed patients undergoing active treatment for breast and hematologic cancers at a cancer institute. Over half of the patients (62%) agreed that cancer-related DTCA increased their awareness about treatments they did not know about previously and 57% agreed DTCA "led to better discussions about health or medical care" with their doctor or nurse. Bell and colleagues (2010) further found that among a convenience sample of participants of an online depression support group, over half (53%) reported they visited official websites of advertised antidepressants, 40% had talked to their doctor about a specific brand or about antidepressants in general, and 18%

talked to a friend or family member about possibly having depression. While the first two communication behaviors are more directed at seeking about the advertised medications, the last behavior is more clearly about discussion with others about health concerns apart from the advertised treatment.

Additional evidence comes from a study by Iizuka and Jin (2005) that reported aggregate levels of DTCA media expenditure were associated with administrative data of physician visits in a nationally representative sample of patients. The study estimated that every $28 increase in DTCA spending led to one additional physician visit within 12 months. However, the study was not designed to provide details about the content of patient-physician discussions during these additional visits, only that they had occurred in association with higher DTCA spending.

In sum, prior literature based on content analysis, patient surveys, and administrative data analysis offer limited support for the potential effect of DTCA on health information seeking behavior that could comprise specific information seeking about an advertised treatment and also about the health condition in general. Drawing from the above literature review, this study posits the following research question:

> RQ1: How is exposure to DTCA associated with patients’ active health information seeking?

Methods

Study Population

Data was obtained from part of a longitudinal population-based study on cancer-related information engagement behaviors and health outcomes among cancer patients in Pennsylvania. The overall study population comprised patients who were diagnosed with breast, prostate, or colorectal cancers and were notified to the Pennsylvania Cancer Registry in 2005. The Pennsylvania State Health Department granted permission to access patient data for this research. Patients with one of these three cancer types were randomly invited to participate in the round 1 survey in September 2006, approximately 9 to 21 months after their diagnoses. Following the initial phase of data collection, an oversample of colorectal cancer patients, those with Stage IV disease, and African American patients was added to facilitate planned subgroup analyses (not presented here). A total of 2013 participants (679 breast cancer patients, 650 prostate cancer patients, and 684 colorectal cancer patients) completed the round 1 survey. The American Association for Public Opinion Research response rates (AAPOR RR#4) (AAPOR, 2006) for breast, prostate, and colorectal cancer patients were 68%, 64%, and 61% respectively. In the fall of 2007, one year after they were first surveyed, 1293 respondents (64.2% of participants from round 1) completed a follow-up survey (round 2). Non-response to the round 2 survey was due to refusal to be re-contacted after round 1 (255 patients; 12.7%) and non-response to a repeat mailed survey at round 2 (465 patients; 23%).

Survey questionnaires were designed following literature review, patient interviews, and expert consultation. Questionnaires were mailed to participants based on a standardized procedure for mail surveys (Dillman & Dillman, 2000). Briefly, a notice letter with the study objectives and opt-out instructions were first mailed to potential participants, followed by the survey, a small monetary incentive (either $3 or $5 in round 1 and $3 in round 2), and a stamped envelope to return survey questionnaires. For participants who did not indicate their wish to opt out of the study and had not returned the survey 2 weeks later, an additional letter and survey was mailed to them. Further details of the data collection and survey instrument development procedures are described fully elsewhere (Kelly, Fraze, et al., 2010; Martinez et al., 2009; Nagler, Gray, et al., 2010; Smith-McLallen, Fishbein, & Hornik, 2011; Tan, Bourgoin, Gray, Armstrong, & Hornik, 2011). The university's institutional review board approved the study.

Measures

Prior research suggests that seeking information from physician or health professional sources is a distinct and complementary communication behavior compared to seeking information from sources other than one's health care provider (Dutta-Bergman, 2004; Finney Rutten et al., 2006; C. J. Lee, 2008, 2009; Ling, Klein, & Dang, 2006; Nagler, Romantan, et al., 2010; Tian & Robinson, 2008). Therefore, to evaluate the first research question that DTCA would predict increased health information seeking, two separate outcome measures were included—patient-clinician information engagement and information-seeking from non-clinician sources, both measured at round

2. The independent variable was exposure to DTCA since cancer diagnosis measured at round 1. Survey items for these variables are provided in Appendix C. Potential confounders in this analysis were prior PCIE and information-seeking from non-clinician sources, demographic variables, and disease characteristics, all measured at round 1.

Patient-clinician information engagement (PCIE) is conceptualized as a measure of cancer survivors' reported engagement with their physicians and other health professionals broadly about information related to their cancer that comprises treatments, quality of life issues, and other topics. The PCIE measure is adapted from a similar measure described in prior studies (Martinez et al., 2009; Tan, Moldovan-Johnson, Parvanta, et al., 2012; Tan et al., 2011). The PCIE variable comprised 6 binary items (yes/no) measured in the round 2 survey. Participants were asked to recall if they 1) actively looked for information about their cancer (about treatments but also about other topics) from their doctors, 2) actively looked for information about their cancer from other doctors or health professionals, 3) actively looked for information about quality of life issues from their doctors, 4) actively looked for information about quality of life issues from other doctors or health professionals, 5) discussed information from other sources with their doctors, and 6) received suggestions from their doctors to go to other sources for more information. The average of these 6 items formed the PCIE scale at round 2 (Cronbach's α=0.73). Parallel survey items measured in round 1 of the survey were averaged into PCIE scale at round 1 (Cronbach's α=0.69). It should be noted that while these survey items do not elicit patients' information seeking about an advertised cancer treatment, some of the items may conceivably capture patients' underlying engagement with their clinicians about a specific ad that they have encountered (e.g., items 1 and 2 ask about looking for information about treatments while item 5 ask about discussing other sources with doctors).

Information seeking from non-clinician sources is conceptualized as a measure of cancer survivors' seeking from sources other than their clinicians about information related to their cancer including treatments, quality of life issues, and other topics. This measure comprised 20 items in the round 2 survey and was adapted from a similar measure described in previous research (Lewis et al., 2011; Tan, Moldovan-Johnson, Gray, Hornik, & Armstrong, 2012). Participants were asked to recall if they actively looked for two topics (information about their cancer or information about quality of life issues) from 10 different sources (family members, friends or co-workers; other cancer patients; face-to-face support groups; online support groups; telephone hotlines; television or radio; books, brochures or pamphlets; newspapers or magazines; internet other than personal email or online support groups; or other). The average of these 20 items formed the information seeking from non-clinician sources scale at round 2 (Cronbach's α=0.82). In the same way, matching survey items in round 1 were averaged to form the information seeking from non-clinician sources scale at round 1 (Cronbach's α=0.81). As in the PCIE measure, information seeking from non-clinician sources may also capture patients' active seeking about an advertised treatment from these sources. This multi-item scale differs substantively from the variable analyzed in the study by Smith-McLallen and colleagues (2011). That study utilized a binary measure categorizing patients as seekers (sought from at least one source other than doctors or health professionals about issues related to their cancer) or nonseekers (did not seek from any source or only from a doctor or health professional) and did not include information seeking about quality of life issues.

Exposure to DTCA is operationalized as frequency of encountering DTCA since cancer diagnosis. Participants were asked at round 1: “Since your cancer diagnosis, how often have you seen or heard advertisements concerning each of the following? Check all that apply.” Responses to three items (treatment alternatives for cancer, dealing with side effects of treatment, and hospitals or doctors offering services for cancer) along a 5-level scale (never, less than every month, about twice a month, about once a week, almost every day) were averaged to form the exposure to DTCA scale at round 1 (Cronbach’s α=0.72).

Potential confounders of the observed associations between DTCA recall and PCIE or information seeking from non-clinician sources at round 2 included prior PCIE and seeking from non-clinician sources at round 1, demographic variables (age, sex, race/ethnicity, and education level) and disease characteristics (cancer type, stage, health status, and worry about cancer (Lerman et al., 1991)) found in prior studies to be significant predictors of information engagement behaviors (Nagler, Gray, et al., 2010) or of exposure to DTCA (Study 2). Cancer stage was derived from the Pennsylvania Cancer Registry and corresponded to the American Joint Committee on Cancer / International Union Against Cancer TNM classification (Greene et al., 2002). All other covariates were based on self-reports in the round 1 survey.

Analyses

Bivariate analyses were first performed to assess cross-sectional associations between exposure to DTCA at round 1 and the dependent variables (PCIE and information seeking from non-clinician sources) at round 2. The assumption of linearity for the relationships between each of the outcome variables and exposure to DTCA was evaluated through visual inspection of the respective scatterplots and tests of linearity. The loess curves of the scatterplots approximated linear relationships closely. Furthermore, tests of linearity were significant for the bivariate relationships between each of the information seeking variables at Round 2 and exposure to DTCA in Round 1 (all *P*s<.0005). The eta-squared and R-squared values for both associations were close in value (difference of 0.014 in both instances). Tests of deviation from linearity were not statistically significant.

Multivariate analyses were performed using the Mplus software version 7 (Muthén & Muthén, 1998) to fit full information maximum likelihood (FIML) models predicting PCIE and information seeking from non-clinician sources at round 2 with exposure to DTCA in round 1. To address the concern about causal direction and potential spuriousness in inferences about these associations, lagged analyses were performed controlling for the corresponding information engagement behaviors at round 1 and other potential confounders.

The FIML technique is reported to be superior to ad hoc methods for dealing with missing data in predictor variables (e.g., listwise deletion, pairwise deletion, mean imputation) and has the benefit of reducing bias and sampling variability in multiple regression models (Enders & Bandalos, 2001; Enders, 2001). Missingness in the predictor and mediator variables mainly involved DTCA exposure (25%), attitudes (29%), PNP (25%), PBC (24%), and intentions (24%). These missing values were largely because 369 patients were randomly selected to answer a short version of the questionnaire in round 1 that excluded these items. Missing values for PCIE and information seeking at both rounds 1 and 2 were minimal (1-2%).

Huber-White covariance adjustments were applied to the estimated standard errors to adjust for non-normality in the data. The models applied post-stratification sample weights to adjust the final sample to represent the patient population from the Pennsylvania Cancer Registry in terms of race, age, gender, marital status, time of diagnosis, and stage at diagnosis; adjust for survey non-response; and account for the oversampling of certain subgroups of patients. This permitted inferences to be made about the broader population of patients with colon, breast, or prostate cancer in Pennsylvania based on the present analyses. The analyses with and without sampling weights were substantively identical. Therefore, only the weighted analyses are reported here.

Results

Table 5.1 summarizes the distribution of the key measures and characteristics of the study population. The average age of the study participants at round 1 was 66 years, 51% was female, 44% had some college education or higher, 83% were white, 67% were married, and 71% had early stage cancer (stages 0 to II). Approximately equal numbers of patients from each of cancer type were represented in the sample (684 colon cancer patients, 679 breast cancer patients, and 650 prostate cancer patients). Preliminary univariate analyses revealed that the distribution of the information seeking and DTCA exposure variables were non-normal (skewness ranged from -0.866 to 1.040; kurtosis ranged from -1.229 to 0.498; all univariate Shapiro-Wilk tests were significant at $p<.00005$).

Table 5.1 Summary Statistics And Characteristics Of Study Population At Round 1

(N = 2013)

	Range	Mean	SD	%
Principal variables (Study 3A)				
Exposure to DTCA at round 1	1.00 to 5.00	2.41	1.02	
Patient-clinician information engagement (PCIE) at round 2	0.00 to 1.00	0.29	0.28	
Information seeking from non-clinician sources at round 2	0.00 to 1.00	0.14	0.16	
Mediator variables (for information-seeking from non-clinician sources) (Study 3B)				
Attitude at round 1	-3.00 to 3.00	-0.15	1.98	
Perceived normative pressure at round 1	-3.00 to 3.00	-0.61	1.93	
Perceived behavioral control at round 1	-3.00 to 3.00	1.16	1.92	
Intention at round 1	-3.00 to 3.00	-0.92	2.16	
Control variables				
Patient-clinician information engagement (PCIE) at round 1	0.00 to 1.00	0.51	0.29	
Information seeking from non-clinician sources at round 1	0.00 to 1.00	0.20	0.17	
Age (years)		66.2	12.4	
Sex				
Female				50.9
Male				49.1
Race/Ethnicity				
White				83.1
African-American				12.8
Hispanic or other race/ethnicity				4.2
Education				
High school or below				56.5
Some college or above				43.5
Cancer Type				
Breast cancer				33.7
Prostate cancer				32.3
Colon cancer				34.0
Lerman Cancer Worry Scale (not at all to almost all the time)	1.00 to 5.00	2.43	1.00	
Cancer Stage				
Stage 0 to II				71.0
Stage III				12.9
Stage IV				16.1
Health Status (poor to excellent)	1.00 to 5.00	3.11	0.94	

From the bivariate correlation analyses, exposure to DTCA at round 1 is significantly associated with PCIE at round 2 (Pearson's r=0.213, p<.00005) and seeking from non-clinician sources at round 2 (Pearson's r=0.288, p<.00005). Table 5.2 summarizes the weighted FIML models predicting PCIE and information seeking form non-clinician sources at round 2 with exposure to DTCA at round 1, controlling for the respective information engagement behaviors measured at round 1 and other potential confounders. The results show that exposure to DTCA at round 1 is significantly associated with subsequent PCIE (unstandardized coefficient B=0.023, 95% CI = 0.005 to 0.040, p = 0.012). However, the association between exposure to DTCA and information seeking from non-clinician sources at round 2 is marginally significant, although as follow-up analyses reported below will show, the indirect path from DTCA to information seeking from non-clinician sources reaches the conventional level of significance. Other significant predictors for both analyses are prior PCIE or information seeking from non-clinician sources at round 1, education level (higher active seeking with some college or higher education), race/ethnicity (higher active seeking in African-American compared to white patients), and cancer-related worry.

Table 5.2 Predicting Patient-Clinician Information Engagement (PCIE) And Information Seeking From Non-clinician Sources At Round 2 (N=1293)

	PCIE at round 2			Seeking at round 2		
Independent variables	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.023	0.005 - 0.040	0.012	0.009	-0.001 - 0.018	0.067
PCIE at round 1	0.348	0.291 - 0.405	<0.001	-		
Seeking at round 1	-			0.466	0.410 - 0.522	<0.001
Age	0.001	-0.001 - 0.002	0.334	0.000	0.000 - 0.001	0.361
Education						
Some college or higher	0.043	0.013 - 0.074	0.005	0.015	0.000 - 0.030	0.056
Race/Ethnicity						
African-American	0.090	0.038 - 0.142	0.001	0.041	0.011 - 0.071	0.008
Hispanic or other	0.026	-0.047 - 0.099	0.486	0.015	-0.033 - 0.064	0.533
Cancer Type						

Female colon cancer	0.043	-0.014	-	0.099	0.139	0.021	-0.006	-	0.048	0.120
Breast cancer	0.040	-0.011	-	0.091	0.123	-0.004	-0.027	-	0.019	0.709
Prostate cancer	0.024	-0.029	-	0.078	0.377	-0.024	-0.047	-	-0.001	0.038
Lerman Cancer Worry Scale	0.039	0.021	-	0.057	<0.001	0.013	0.004	-	0.022	0.003
Cancer Stage										
Stage III	0.051	-0.007	-	0.110	0.084	-0.009	-0.033	-	0.014	0.431
Stage IV	0.071	0.016	-	0.126	0.011	0.013	-0.013	-	0.038	0.329
Health Status	-0.003	-0.021	-	0.014	0.700	-0.001	-0.010	-	0.008	0.772
Constant	0.161					0.044				
R^2	0.243						0.348			

Notes. Full information maximum likelihood models presented here; B refers to unstandardized maximum likelihood coefficients; referent group for education level is high school and below; referent group for race/ethnicity is white; referent group for cancer type is male colon cancer; cancer type and gender was combined into a single variable to reflect the different gender-specific cancer types (breast and prostate cancers); referent group for cancer stage is stage 0-II.

Study 3B Mediational Analysis of DTCA Exposure on Information Seeking from Non-Clinician Sources Through Integrative Model Variables

Extending from the above findings described in Study 3A, Study 3B explores potential psychosocial mechanisms for the associations between DTCA exposure and information seeking behaviors. I first review prior literature on the psychosocial pathways of DTCA effects on patients’ inquiry about the advertised medication to draw general hypotheses about theoretical mechanisms between DTCA exposure and health information seeking behaviors more broadly. Next, guided by the Integrative Model of Behavioral Prediction (IM), I elaborate specific hypotheses about the relationships between DTCA exposure, IM variables, and active information seeking and test these hypotheses with a structural equation modeling approach.

Psychosocial Mediators of DTCA Effects on Drug Information Seeking

Prior research relied on wide-ranging theoretical models or constructs in examining psychosocial mechanisms through which DTCA may influence health knowledge acquisition in consumers. For example, in a series of content analyses based on Social Cognitive Theory to evaluate visual and textual cues of DTCA, Welch Cline and Young (2004, 2005) reported frequent occurrences of cues that modeled identity rewards (e.g., models depicted as healthy, active, or friendly in the ads) and relational rewards (e.g., models depicted as a family or as romantic partners) in conjunction with the advertised product. The authors posited that these cues served as vicarious motivators for patients to either find out more about the advertised treatment *or* to seek treatment for symptoms similar to those in the ads. Subsequent survey research by the same authors among young women further suggested that positive outcome expectancies of discussing about an advertised drug with their physicians were associated with increased intention to communicate with physicians about the drug (H. N. Young et al., 2005). However, the study did not elaborate on the role of outcome expectancies of discussing health information more generally in predicting patient-physician discussions about health concerns.

Grounded in the Theory of Planned Behavior and Self-Efficacy Theory, Liu and colleagues (2005) found that attitudes and subjective norms toward seeking drug information from physicians and pharmacists predicted intention to seek from these sources among a sample of patients with osteoarthritis. In contrast, only attitudes toward seeking drug information from the internet predicted intention to seek from the internet. Perceived difficulty was not predictive of intentions to seek from all three sources. Moreover, as predicted by the theoretical models, intentions predicted actual behavior of seeking drug information from all three sources at 6-weeks follow-up. Similar to the studies by Welch Cline and Young (Welch Cline & Young, 2004; H. N. Young et al., 2005; H. N. Young & Welch Cline, 2005), the study was focused on specific drug information seeking behaviors and did not examine parallel models to explain patients' general information seeking about osteoarthritis.

Deshpande and colleagues (2004) investigated a shared decision-making model of public perceptions of DTCA and showed that more favorable opinions about DTCA utility (a scale derived from items asking participants to rate their agreement with three statements of whether DTCA allowed people to be more involved with their health care, make decisions about prescription medicines, and educate people about risks and benefits of prescription medicines) were associated with increased likelihoods of engaging in drug inquiry behavior about a drug with physicians, requesting a drug from physicians, and inquiring about a medical condition or illness. Of particular relevance to the present dissertation research is the finding that positive opinion about DTCA utility was associated with an increased odds of 2.12 times that respondents utilized ad information to talk to their doctor about a medical condition. In comparison, positive opinion of DTCA utility was associated with increased odds of 2.25 times that respondents used ad information to talk to their doctor about a prescription drug. The parallel findings suggest that similar pathways through opinions of DTCA utility may be operating in the associations between DTCA and drug inquiry or more general information seeking behaviors.

Two recent studies examined the role of general attitudes toward DTCA on intentions to search for specific medication information. In the first, Herzenstein and colleagues (2004) found that favorable attitudes toward DTCA was associated with increased likelihood to search for more information about an advertised drug and increased likelihood to ask their physician about such a drug in a cross-sectional survey among a national telephone sample of 1081 adults. Independently, the second study by An (2007) noted similar findings that positive general attitudes toward DTCA predicted higher intentions to ask doctors about a specific medication or advertised treatment in a cross-sectional telephone survey of 203 residents in a Midwestern town.

To summarize, the majority of existing literature exploring the psychosocial mechanisms of DTCA effects on patient information seeking behaviors focused primarily on drug information seeking. There is limited empirical research available to identify the psychosocial mediators of DTCA effects on more general health information seeking related to patients' condition. Study 3B is aimed at addressing this research gap to analyze whether similar pathways may be operating in explaining the associations between DTCA and broader health information seeking behaviors.

The Integrative Model of Behavioral Prediction

Extending from the findings in Study 3A and the prior research evidence on the predictors of drug inquiry behavior, this study explores the roles of psychosocial mediators of health information seeking guided by the Integrative Model (IM) of Behavioral Prediction—a model that is based on well-established explanatory models of health behaviors (i.e., Health Belief Model (Rosenstock, 1974), Theory of Reasoned Action/ Theory of Planned Behavior (Ajzen, 1991; Fishbein & Ajzen, 1975, 2010), and Social Cognitive Theory (Bandura, 1986)).

The IM specifies a causal pathway between one's intention to perform a behavior and the actual engagement in the behavior. Additionally, behavioral intention is theorized to be influenced by individuals' underlying attitudes toward the behavior, perceived normative pressure (PNP) to perform the behavior, and perceived behavioral control (PBC) associated with enacting the behavior. Intention is operationalized as an individual's self-reported likelihood of performing a behavior in a future timeframe. Intention is further defined in terms of specific time, action, context, and target to be compatible with the behavior of interest. Attitude toward the behavior is defined as "degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p.188) (i.e., whether performing the behavior would be good or bad for oneself, beneficial or harmful, wise or foolish). PNP is a person's "perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p.188) or whether important others think one should or should not perform the behavior and whether others who are similar are also performing the behavior. PBC refers to "people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991, p183), that is whether someone believes that he or she would have the ability to perform the behavior and that it would be under his or her control to engage in the behavior.

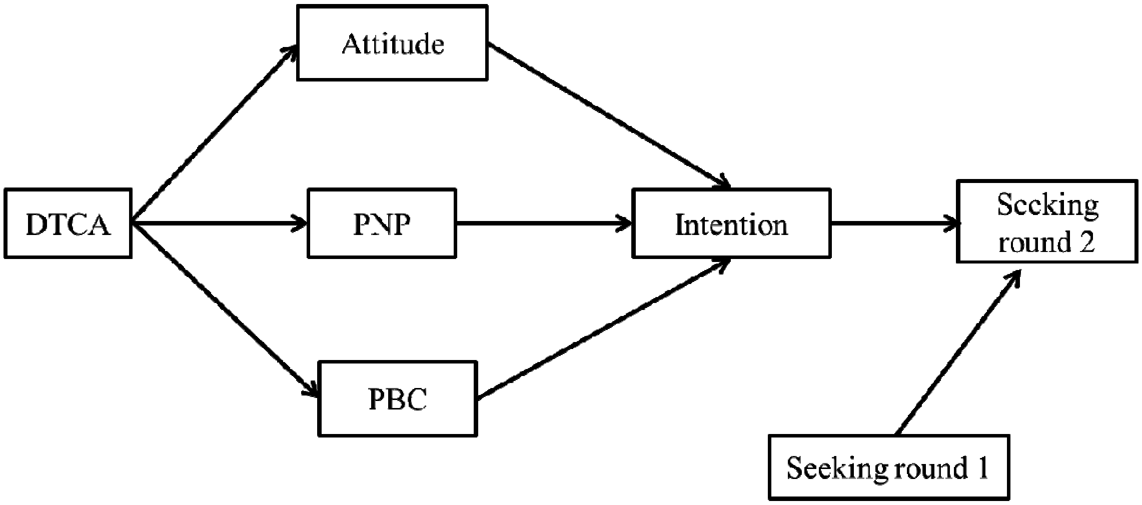
Based on these constructs of attitudes, PNP, and PBC from the IM, Smith-McLallen and colleagues (2011) conducted an earlier study using the same data source as this present analysis to examine the predictors of cancer patients' information seeking from sources other than their doctor. The analysis showed that attitudes, PNP, and PBC were significantly associated with intentions to seek information. In addition, consistent with the predictions in the IM, intentions to seek information predicted actual behavior or information seeking at one-year follow-up. This present study aims to build on the above analysis in assessing the relationships between DTCA exposure and these IM constructs and evaluating whether the IM variables mediate the association between DTCA exposure and active information seeking.

Applying the above IM constructs to this present study, DTCA exposure is hypothesized to influence attitudes, PNP, and PBC regarding active information seeking in the following ways. For instance, spokespersons featured in DTCA may serve as role models for patients to actively engage with their physicians to talk about their health condition. These portrayals of patient-doctor discussions convey positive outcome expectations about the health information seeking that are associated with positive attitudes toward the behavior. They may also influence perceived descriptive norms that other patients in a similar situation are likely to consult their doctor for information about treatment options. DTCA may further improve behavioral control through observing spokespersons enacting discussions effectively in the ad. In addition, DTCA may offer additional information aimed at empowering patients’ ability or self-efficacy to discuss with their doctor about their condition. Existing DTCA for prescription drugs serve to illustrate the potential mechanisms through these IM constructs. For example, in an ad for Detrol LA (tolterodine), an actor depicted having overactive bladder symptoms. She modeled the behavior of navigating a dedicated website (DetrolLA.com) that provided tips on how she could get the discussion started with her physician about her symptoms. The ad concluded with this actor having improved symptoms and the message to “Have the Detrol Discussion with your doctor”. A second example is the Chantix ad described earlier in Study 3A. In these examples, the main message was for viewers to talk to their physician about their symptoms and secondarily about whether the advertised medication would be appropriate for them. In both cases, cues corresponding to positive outcome expectancies, descriptive norms, and self-efficacy associated with enacting information seeking (e.g., about tips to manage health concerns or about how to discuss a health concern with one’s doctor) are featured in varying extents and may potentially influence patients’ attitudes, PNP, and PBC regarding information seeking behaviors.

The above review of prior literature precludes generalizing from the observed psychosocial mechanisms underlying DTCA effects on drug inquiry to explain DTCA effects on general information seeking behaviors. Thus far, there is insufficient research directly related to general information seeking following DTCA exposure. However, conceptually there is an argument to be made that seeking information about an advertised treatment, while a distinct behavior, may be a subset of general cancer-related information seeking. Therefore, it is reasonable to assume that parallel mechanisms may be operating in the relationship between DTCA and general information seeking, mediated through the IM constructs of attitudes, PNP, and PBC. Furthermore, existing examples of broadcast DTCA indicate the presence of cues that correspond closely with these IM constructs pertaining to general information seeking behaviors. Therefore, this study proposes to test the following hypothesis:

> H1: The association between DTCA and active health information seeking would be mediated by the psychosocial constructs of the Integrative Model (see Figure 5.1 for a graphical representation).

Figure 5.1 Hypothesized Mediation Model Predicting Information Seeking From Non-clinician Sources At Round 2



Notes. DTCA = cancer-related direct-to-consumer advertising exposure; PNP = perceived normative pressure; PBC = perceived behavioral control; all predictor and mediator variables are measured at round 1 of the survey; each path implied in the above model was adjusted for information seeking at round 1 and other confounders (age, education, race/ethnicity, cancer type, gender, Lerman worry scale, cancer stage, and health status) which are omitted in the figure for clarity; disturbance terms of attitudes, PNP, and PBC are specified to be correlated with one other.

Method

Study Population

The study population for Study 3B is as described in Study 3A above. This analysis utilized data from Rounds 1 and 2 of the longitudinal survey among breast, prostate, and colorectal cancer patients in Pennsylvania.

Measures

To test the above mediation hypothesis, IM variables included intention, attitudes, perceived normative pressure (PNP), and perceived behavioral control (PBC) associated with information-seeking from non-clinician sources, all measured at round 1. Due to survey constraints, parallel IM measures for patient-clinician information engagement were not collected in this study and are not tested here.

The IM variables are defined as described in an earlier study with this data source by Smith-McLallen and colleagues (2011). Survey items for these variables are provided in Appendix C. *Intention* to actively seek information from non-clinician source was measured with a single item: “How likely is it that you will actively seek information about issues related to your cancer from a source other than your doctor in the next 12 months?” along a 7-point scale (anchored between unlikely to likely).

Attitudes comprises three semantic differential items that asked participants if their actively seeking information about issues related to their cancer from a source other than their doctor in the next 12 months would be “useless/useful”, “unenjoyable/ enjoyable”, and “foolish/wise” along a 7-point scale. The average of these three items formed the attitude scale (Cronbach’s α=0.89).

Perceived normative pressure (PNP) is the average of ratings of two statements along a 7-point scale from “disagree” to “agree”: “Most people who are important to me think I should actively seek information about issues related to my cancer from a source other than my doctor in the next 12 months” and “Most people like me (e.g., other cancer patients) actively seek information about issues related to their cancer from a source other than their doctors” (inter-item correlation r=0.53).

Perceived behavioral control (PBC) is the average of ratings of two items. The first item asked participants if their actively seeking information from a source other than their doctor in the next 12 months would be “not up to me/ up to me”. The second item asked participants to rate the statement “If I really wanted to, I could actively seek information about issues related to my cancer from a source other than my doctor in the next 12 months” along a 7-point scale from “disagree” to “agree” (inter-item correlation r=0.37). All above mediator variables were measured at round 1 and ranged from -3 to 3.

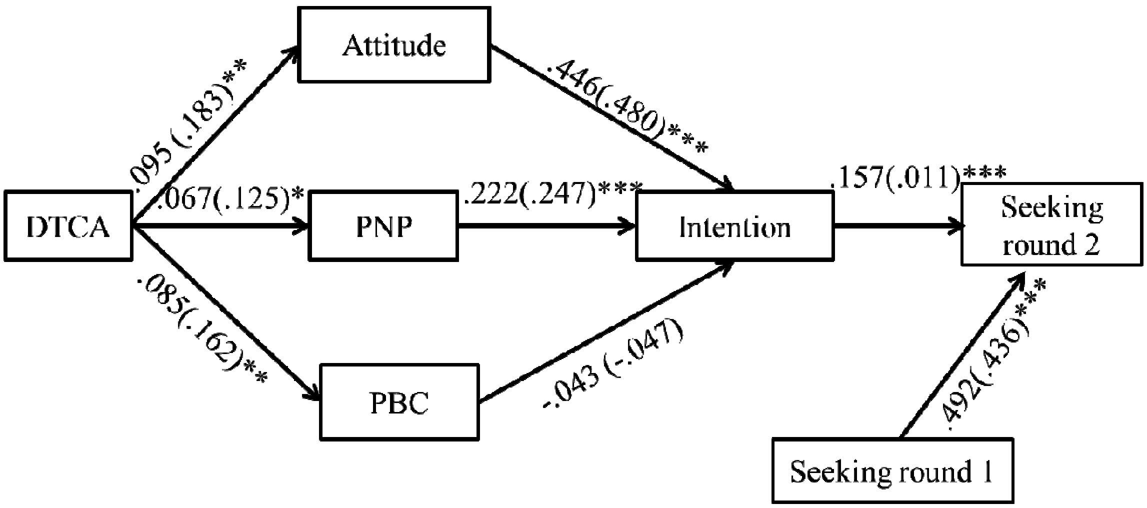
Analyses

The structural equation model implied in Figure 1 is fitted using the Mplus software to assess the mediation hypothesis. In short, exposure to DTCA is modeled to predict attitudes, PNP, and PBC associated with information seeking from non-clinician sources at round 1. Consistent with the IM, these constructs are modeled to predict intention at round 1 which in turn predicts information seeking from non-clinician sources at round 2. As recommended by Preacher and Hayes (2008, p.882), covariances between the IM constructs (attitudes, PNP, and PBC) are permitted by specifying correlations between the disturbance terms of these endogenous variables. The model further controls for prior information seeking from non-clinician sources at round 1 and potential confounders and applies post-stratification sample weights as described in the earlier section. Model goodness of fit is assessed using a combination of indices including the overall χ^2 test of model fit, comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Parameter residuals and modification indices are inspected for areas of poor fit and examined for theoretically supported alternative models.

Results

Figure 5.2 summarizes the results from the mediation analysis testing the indirect effects of DTCA exposure on information seeking from non-clinician sources through the IM variables. Standardized parameter estimates for the structural coefficients are presented along with the unstandardized estimates in parentheses. The overall χ^2 test for model fit is statistically significant ($\chi^2(5)=14.948$, $p=0.011$). However, this test is sensitive to large sample sizes (Kline, 2011). Other indices of model fit suggest that the model is a reasonably good fit to the observed data RMSEA=.031, CFI=.995, TLI=.924, SRMR=.007). An inspection of residuals and modification indices did not reveal theoretically meaningful points of poor fit in the model and the hypothesized model is retained. The analysis shows that controlling for prior information seeking from non-clinician sources and potential confounders, intention at round 1 is a significant predictor of active seeking from non-clinician sources at round 2. Attitudes and PNP are significantly associated with intention but PBC is not significantly associated with intention. DTCA exposure is significantly associated with all three IM constructs of attitudes, PNP, and PBC related to active seeking from non-clinician sources. Table 5.3 displays standardized estimates of the indirect mediational chains from DTCA exposure through the IM variables to information seeking from non-clinician sources based on the structural model. The results show that the total indirect path from DTCA through the IM variables is statistically significant and suggest evidence partially supporting Hypothesis 2. Of the three possible mediated pathways, the indirect effect from DTCA through attitudes and intention is statistically significant while the indirect effect through PNP and intention approaches significance.

Figure 5.2 Mediation Model Predicting Information Seeking From Non-clinician Sources At Round 2 (N=2013)



Notes. Model fit was assessed based on the overall χ^2 test ($\chi^2(5)=14.948$, $p=0.011$) and other fit indices (RMSEA=.031, CFI=.995, TLI=.924, SRMR=.007); DTCA = cancer-related direct-to-consumer advertising exposure; PNP = perceived normative pressure; PBC = perceived behavioral control; all predictor and mediator variables are measured at round 1 of the survey; standardized coefficients for each parameter (and unstandardized coefficients in parentheses) based on full information maximum likelihood models are presented here; *p<.05, **p<.01, ***p<.0005; each path implied in the above model was adjusted for information seeking at round 1 and other confounders (age, education, race/ethnicity, cancer type, gender, Lerman worry scale, cancer stage, and health status) which are omitted in the figure for clarity; error terms of attitudes, PNP, and PBC are assumed to be correlated with one other.

Table 5.3 Indirect Effects Of Exposure Cancer-Related Direct-To-Consumer Advertising (DTCA) On Information Seeking From Non-clinician Sources At Round 2 (N=2013)

Paths	b	95% CI	p
DTCA to Attitude to Intention to Seeking	0.007	0.001 - 0.012	0.017
DTCA to PNP to Intention to Seeking	0.002	0.000 - 0.005	0.067
DTCA to PBC to Intention to Seeking	-0.001	-0.001 - 0.000	0.176
Total indirect effects	0.008	0.002 - 0.015	0.016

Notes. b refers to standardized maximum likelihood estimates of indirect effects through each path; DTCA = cancer-related direct-to-consumer advertising exposure; PNP = perceived normative pressure; PBC = perceived behavioral control; the model controlled for prior information seeking at round 1 and other confounders (age, education, race/ethnicity, cancer type, gender, Lerman Cancer Worry Scale, cancer stage and health status) which are omitted in the table for clarity.

Discussion

Much of the controversy surrounding the societal value and risks of DTCA centers around the argument over the idea that patients' interests are better served with this form of public health communication. From a patient empowerment standpoint, proponents contend that DTCA places valuable health information in the hands of patients, fosters a patient-centered model of health care delivery, and strengthens patient-physician communications by emphasizing patients to be active participants in managing their health conditions and treatment decisions (Calfee, 2002; Holmer, 1999, 2002).

Opponents counter that reliance on DTCA, which is at heart motivated by profit generation for advertisers and manufacturers, to perform such a crucial public education role would be a “haphazard approach to health promotion” (Hollon, 2005) and could undermine the public’s health (Avorn, 2003; Hollon, 1999; Wilkes et al., 2000).

This current study offers new empirical evidence to inform the ongoing debate of the communication impact of DTCA by assessing the spillover effect of DTCA on cancer patients’ active health information seeking behaviors from clinicians and non-clinician sources. The analyses in Study 3A indicate that exposure to DTCA is significantly associated with subsequent cancer patients’ active information seeking from physicians and other health professionals. In comparison, the relationship between DTCA exposure and subsequent information seeking from non-clinician sources approaches significance.

The first substantive finding supports the inference that DTCA about cancer treatment is associated with the beneficial externalities of increasing patient information engagement with health professionals about general cancer-related information, consistent with such benefits outlined in a review about DTCA in general by Calfee (2002). This finding supplements earlier empirical evidence from patient or consumer surveys that showed associations between DTCA and information inquiry about advertised medications (Abel et al., 2009; Aikin et al., 2004; Bell et al., 2010; Weissman et al., 2003). A related assumption made here is increased patient-clinician communication about health information is a beneficial outcome for patients’ well-being and this assumption is supported by previous theorizing and empirical findings from this research group and elsewhere (Epstein & Street Jr., 2007; Martinez et al., 2009; Mello, Tan, Armstrong, Schwartz, & Hornik, 2012; Street Jr. & Epstein, 2008; Street Jr. et al., 2009).

The current study contributes new evidence to the debate on the societal value of DTCA by emphasizing that DTCA may have a previously unmeasured and unintended benefit of gradually shifting the paradigm of a paternalistic health care delivery model to a patient-centered one by encouraging patients to be more active participants in understanding their health condition and treatment options (Beltramini, 2010; Deshpande et al., 2004). This inference about possible DTCA externalities invites consideration of the potential implications on practice and policy regulations surrounding DTCA. On one hand, the inference would lend support to the argument by proponents that DTCA indirectly benefits patients by encouraging broader health information seeking behaviors. As a result, policies governing DTCA should be relaxed to promote greater dissemination of valuable health information to consumers (Calfee, 2002). On the other, the question arises as to whether there might be more cost-effective and direct means than DTCA to achieve improved patient information seeking from health professionals (Avorn, 2003).

One limitation in Study 3A is the information seeking measures may have included patients’ drug inquiry behaviors as well. The outcome measures therefore do not clearly distinguish between specific information seeking about advertised cancer treatments from seeking about other health topics related to cancer (e.g., other treatment options or quality of life issues). However, it is unlikely that the seeking measures are fully accounted for by patients' inquiries about advertised treatment alone. First, the survey items asked participants about their seeking of broad topics over the course of 12 months and not just about advertised treatments. Moreover, multiple items pertain to seeking information about quality of life issues and these are less likely to overlap with drug inquiry behaviors. Third, unlike prior studies that relied on single items to elicit the impact of DTCA on patient behaviors (e.g., "Has an advertisement for a prescription drug prompted you to talk to your cancer doctor or nurse about a drug for yourself?" (Abel et al., 2009)), this research relies on independent items for DTCA exposure and information seeking behaviors. There is less risk that participants were only responding about their seeking of information about advertised treatment in answering the survey items on active information seeking. Despite these reasons, future surveys should consider designing items that measure patients' inquiry about advertised treatments independently from patients' health information seeking about other cancer-related topics following DTCA exposure.

This research further draws on the IM to identify the psychosocial mechanisms that may account for the relationship between DTCA exposure and health information seeking behaviors. Expanding from the findings in Study 3A and relying on available survey items related to information seeking from non-clinician sources, the analyses in Study 3B found an indirect mediation pathway between DTCA exposure and active seeking from non-clinician sources through patients' attitudes and intention associated with seeking from these sources. This analysis points to an inference about a potential mediational pathway for the influence of DTCA on information seeking behaviors through favorable attitudes about active information seeking and intention to seek cancer-related information from non-clinician sources. These findings corroborate those reported in earlier research describing the roles of similar psychosocial constructs (e.g., favorable outcome expectancies or attitudes toward DTCA) in predicting intention or behaviors of drug inquiry and prescription requests (An, 2007; Deshpande et al., 2004; Herzenstein et al., 2004; Liu et al., 2005; H. N. Young et al., 2005). The accumulated evidence so far offers intriguing insights into one possible underlying mechanism to explain the spillover effects of DTCA on patients' health information seeking behaviors. These insights may generate additional research hypotheses for programmatic research to study the communication effects and pathways of DTCA.

Due to survey limitations, parallel IM measures for patient-clinician communication were not available to test a similar mediation pathway leading from DTCA exposure to active seeking from clinician sources. Additional research to examine whether corresponding patterns of mediation by IM constructs may be required. Building on the present study, a follow-up content analysis may be directed at describing the prevalence and content of specific DTCA messages that are likely to be associated with the IM constructs of attitudes or perceived norms about engaging in active health information seeking. Documenting the presence of these messages linked to the theoretical constructs systematically would strengthen the explanatory inference of the observed relationships between exposure to DTCA and attitudes, PNP, and PBC in this study. Despite the efforts to establish temporal order and controlling for prior information seeking and other potential confounders, the causal direction between DTCA exposure and the IM constructs remain unclear since these variables were all measured at round 1. For instance, it is plausible that attitudes about information seeking may have led to patients' recalling more DTCA exposures. Another follow-up study may focus on assessing the causal relationship between DTCA exposure, IM constructs, and information seeking behaviors using an experimental design to compare patients' information seeking behaviors following random assignment to a treatment condition receiving DTCA (e.g., embedded in patient-directed health magazines) or a control condition receiving no DTCA. Findings from the follow-up would provide additional evidence about the causal relationships between DTCA and information seeking behaviors through the IM constructs.

It is essential to exercise caution in interpreting these results more generally to be applicable for all forms of DTCA or across diverse types of patients with different health conditions. Because the severity, nature of treatment, and characteristics of afflicted patients may differ dramatically across various health conditions, it is plausible that the relationships observed in this study among cancer patients may not be identical for other patient populations. To illustrate, cancer treatment is considerably more complex, often requires care across multiple specialties, and involves significant risks and adverse effects compared to other forms of treatments that commonly appear in DTCA. Instead of advertising limited to just prescription medications, cancer treatment advertising also extends to marketing campaigns by health care providers (e.g., physicians, hospitals, or comprehensive treatment centers) and ads related to non-drug therapies such as radiosurgery. Further research would be necessary to investigate if the relationships observed in this study may be replicated in other health conditions and patient populations before drawing more general inferences about overall DTCA effects on health information seeking behaviors. Another limitation in this study, inherent in survey research, is the reliance on self-reported measures for exposure to DTCA and other principal variables, which may be subject to recall bias (Schutt, 2009). A separate study evaluated the validity of the DTCA exposure measure used in this present research among an independent sample of cancer patients and is described earlier (Study 1).

This present study differs from previous research on informational effects of general DTCA that strengthens the study inferences in a few ways. First, recognizing the unique context of cancer treatment in comparison to other disease conditions, this study focuses on the effects of exposure to a specific subset of advertising (i.e., cancer-related DTCA) among cancer patients. This ensures that the DTCA exposure in question is highly salient for the study population. In contrast, earlier research typically measured exposure to DTCA in general among healthy consumers for whom the DTCA may have little salience (Aikin et al., 2004; Weissman et al., 2003). Second, prior surveys tended to rely on cross-sectional survey designs in analyzing associations between DTCA exposure with information seeking behaviors or psychosocial measures. These surveys were therefore limited in their ability to untangle the causal direction of the associations. In comparison, this study relies on panel data to establish temporal order between DTCA exposure and information seeking behaviors and further controls for prior information seeking behaviors as means to strengthen inferences about the causal direction. Third, the majority of research on DTCA effects has insufficiently integrated study findings within theoretical frameworks to inform future research programs. This study is an attempt to add to the understanding of DTCA influences on communication behaviors using the IM approach.

In sum, this study analyzes the effects of exposure to DTCA on subsequent cancer-related health information seeking behaviors (from health professionals and non-clinician sources) in the context of cancer treatment advertising in a population-based panel of cancer patients. The findings show that increased exposure to DTCA significantly predicts increased levels of active health information seeking from health professionals. DTCA is marginally significant in predicting information seeking from non-health professional sources and attitudes and intention toward active information seeking mediate this relationship. These results offer important insights into the practice and policy debate surrounding DTCA and stimulate additional research questions to explore theoretical mechanisms of the impact of DTCA on patient communication behaviors.

Chapter 6 EXPLORING COMMUNICATION INEQUALITIES ASSOCIATED WITH EXPOSURE TO CANCER-RELATED DIRECT-TO-CONSUMER ADVERTISING IN CANCER SURVIVORS (STUDY 4)

Abstract

This study draws from the Structural Influence Model of Communication as a framework to explore potential communication inequalities arising from patients' exposure to cancer-related direct-to-consumer advertising (DTCA). The model posits that communication inequalities associated with cancer-related DTCA may arise at three distinct but related levels: 1) certain groups may be less likely to gain exposure to DTCA, 2) differential attention and processing of DTCA may occur, and 3) some groups may not engage in additional information seeking after viewing DTCA. These inequalities, if substantial, may in turn propagate disparities in cancer outcomes in certain disadvantaged patient populations. Earlier studies from this dissertation research and prior literature support the claim that there are inequalities in exposure to cancer-related DTCA across various patient characteristics. However, studies that examine attention and processing or additional information seeking following DTCA exposure show mixed results regarding inequalities in these communication outcomes. To contribute to the literature in communication inequalities associated with public health information, this study analyzes the moderation effects of age, educational level, race/ethnicity, and cancer type on the associations between cancer patients' reported exposure to DTCA and their active information seeking behaviors from their clinicians or from non-clinician sources of

health information. Based on a series of cross-sectional and lagged analyses of longitudinal survey data from a population-based sample of 2013 cancer patients from Pennsylvania, the results do not suggest that the association between DTCA exposure and active information seeking behaviors are contingent on patients’ age, educational level, race/ethnicity, or cancer type. Implications on the debate about communication inequalities of DTCA and suggestions for future research questions are discussed.

Introduction

Recent critical reviews and extant research surrounding both general and cancer-related direct-to-consumer advertising (DTCA) highlight increasing concerns that given the presence of communication inequalities among different social groups in the population (e.g., by class, race, ethnicity), these forms of advertising may inadvertently result in widening disparities in cancer outcomes between social groups. In a review focusing on the potential for disparate effects of cancer-related DTCA in the population, Kontos & Viswanath (2011) advocated "…closer and critical scrutiny of the effects of DTCA and other types of marketing communications on a variety of cancer-related outcomes, including patient engagement, patient-provider relationships, adherence, compliance and treatment outcomes, is warranted." Thus far, few empirical studies have directly assessed the presence of social inequalities of cancer-related health behaviors or outcomes in association with DTCA exposure despite the prevalence of consumer advertising of medical products and services for the past thirty years.

The previous study of this dissertation project (Study 3) examined whether cancer survivors' exposure to cancer-related DTCA predicted subsequent information seeking behaviors (i.e., patient-clinician information engagement (PCIE) and seeking from non-clinician sources) and explored potential mechanisms for this relationship. The present study examines whether such DTCA may have disproportionate influences on cancer-related information seeking behaviors across different social groups. I first summarize theoretical and practical justifications for expecting such differential effects by describing various levels of communication inequalities based on a literature review. Next, I propose hypotheses and research questions testing specific moderating factors pertaining to DTCA exposure and information seeking behaviors. Following this, research methods and results based on an analysis using data from the Cancer Patient Survey (2006 and 2007) are described. Finally, implications of the findings for future research, practice, and policies relevant to DTCA will be discussed.

Structural Influence Model of Communication

Kontos & Viswanath (2011) described the Structural Influence Model of Communication as a framework to study disparities in health communication and the roles these disparities play in mediating relationships between social determinants (e.g., race, education, and income), access to healthcare resources, and more distal health outcomes (e.g., health behaviors, adherence, and treatment outcomes). As outlined in an earlier chapter, the underlying premise for this model is the notion that “control of communication is power and that whoever has the capacity to generate, access, use and distribute information enjoys social power and advantages that accrue from it”. According to the model, communication inequalities that may lead to health outcomes disparities include differences between social groups in terms of their: 1) exposure, 2) attention, 3) external information seeking, and 4) processing of health information.

Applying concepts of this model to the studying the population impact of cancer-related DTCA, Kontos & Viswanath (2011) hypothesized communication inequalities associated with DTCA may arise at three distinct but related levels: 1) certain groups may be less likely to gain exposure to DTCA, 2) differential attention and processing of DTCA may occur, and 3) some groups may not engage in additional information seeking after viewing DTCA. If such inequalities exist, DTCA may have differential effects on cancer outcomes between certain groups of patients. One concrete example is if some groups were more likely to be exposed to DTCA or attend to such ads, they may be more aware of a wider variety of effective treatment options available for their cancers than others. Second, if certain groups were better able than others to process the risk and benefit information of advertised treatments for their specific cancer diagnosis conveyed in DTCA, they may be more likely to participate more actively in shared treatment decision-making with their physicians. Third, if some groups had greater access to resources for additional information seeking about advertised treatments, they may be better informed of potential side-effects and be more prepared to cope with these problems during treatment. These communication disparities may widen cancer outcomes disparities between these groups of patients. Therefore, research is necessary to assess whether certain groups of cancer patients have higher exposure to DTCA than others (as described in Study 2) and whether certain groups are more likely to engage in additional information seeking following exposure to DTCA (Study 4).

Communication Inequalities and DTCA

For the purposes of this research, communication inequalities among cancer survivors associated with DTCA are categorized broadly in terms of: 1) exposure, 2) attention and information processing, and 3) external information seeking (adapted from Kontos & Viswanath (2011) and Viswanath et al., 2006). I discuss each of these levels of inequalities as they relate to DTCA and where relevant, implications of these inequalities for the present research on cancer survivors' information seeking behaviors.

First, opportunities for exposure to DTCA may differ between social groups and this in turn may lead to different levels of actual exposure. Disparities in exposure arise because ads tend to be intentionally placed in media outlets that target specific social or ethnic groups and not others. To illustrate, Omunuwa (2001) reported in a content analysis of women's magazines that frequency and type of pharmaceutical ads differed depending on the target audience of magazines. The author found the overall number of pharmaceutical ads in white-oriented magazines exceeded those in black-oriented magazines by four to eight times during the study period. Additionally, ads in white-oriented magazines but absent in black-oriented magazines promoted medications for conditions such as osteoporosis, menopause, Alzheimer's disease, weight reduction, arthritis, high cholesterol, and tobacco cessation. In contrast, certain ads in black-oriented magazines did not appear in white-oriented magazines, including those that promoted antiviral treatment for HIV or oral contraception. It should be noted the study did not measure actual exposure among women across ethnic groups. Rather, the focus was on *opportunity* for exposure through magazines. It is possible that black women's overall exposure to prescription ads may not differ appreciably from white women if they also read white-oriented magazines, which are more prevalent and widely circulated. Another related reason for differential exposure across groups could be selective media use or limited access to certain media by different groups. One example of such a scenario is when a health service or treatment is advertised through the internet but certain groups would not view these ads because they are less likely to use the internet (e.g., those with lower educational attainment, low household income, and Hispanics are least likely to have access to the internet) (Kontos, Emmons, Puleo, & Viswanath, 2010). Together, selective placement by advertisers and selective media usage by groups may result in communication inequalities among cancer survivors and create situations where some groups are more likely to be exposed to DTCA while others are not. To the extent that the above exposure inequalities may be operating, this may lead to some groups benefitting disproportionately from the availability of DTCA compared to others in the population, and perpetuate further disparities in cancer outcomes.

The second level of inequality is the presence of differential attention and processing of cancer treatment information presented in DTCA. One important reason for differential attention and information processing across groups is the high level of literacy demanded to comprehend content presented in many ads or supplemental information materials. This is supported by studies reporting that content in the majority of general DTCA of prescription medications (83%) exceeded the eighth-grade reading level typically recommended for the public (Chao, 2005). Correspondingly, Kaphingst et al. (2004) reported the average reading grade level of supplemental information for DTCA—print ads in magazines, drug manufacturer websites, and mailed brochures—was in the high school range (grades 10.5-11.6) for main texts of these materials and in the college-level range (grades 13.7-14.1) for summary sections of materials. Another related issue for differential processing is the format of DTCA that typically emphasized benefits of products over risks involved (Kaphingst & DeJong, 2004). Particularly for those with limited literacy skills, existing DTCA formats which privilege promotion of benefits of medications may result in poorer comprehension of adverse side effects of advertised drugs. In a study among a convenience sample of 50 adults with limited literacy, researchers found respondents were less likely to answer comprehension questions about risks of three advertised drugs correctly than questions about benefits of these drugs (Kaphingst, Rudd, DeJong, & Daltroy, 2005). The interaction between health literacy level (as measured using the Rapid Estimate of Adult Literacy in Medicine or REALM score) and country of birth adds another complexity in predicting comprehension of information presented in DTCA in that study. Extending the results from these studies based on general DTCA of prescription medications, the implications for potential inequalities in attention and processing of cancer-related DTCA (not just about medications, but also about health providers and alternative treatments) by different groups would be concerns that cancer patients with average health literacy may find it difficult to understand and process treatment-related information in such advertising, assess the attendant risks of treatments, and make meaningful decisions about treatments based on their exposure to DTCA.

Third, additional health information seeking arising from cancer-related DTCA may differ between social groups, even with adequate exposure, attention, and processing of content in such DTCA. Given short durations of most televised DTCA (usually one minute or shorter), which precludes presentation of detailed or complex information about treatments, viewers are typically directed to find out more information from external sources (e.g., print ads, toll-free number, health providers, and manufacturer's website). This is especially necessary for cancer-related DTCA because cancer treatments entail higher risks and can involve multiple complex decisions that include consultations with a variety of medical specialists. There is evidence to support the notion that health information seeking behaviors are driven by social determinants including education, social class, or ethnicity (Jeff Niederdeppe, 2008; Ramanadhan & Viswanath, 2006). One reason leading to differential information seeking is the issue of barriers to access media channels or medical advice. Barriers including time or financial costs associated with searching information on the internet or arranging for physician consultations may prevent certain social groups from seeking external information after viewing a specific cancer treatment ad. A related explanation is that differences in information seeking behavior are due to variations between groups in their ability or motivation to act on the information from DTCA. For instance, patients from low socioeconomic statuses are less likely to request advertised medications from their health providers (Parnes et al., 2009). This is partially attributable to medication costs being a substantial financial burden for these patients, thereby discouraging low-income patients from requesting advertised brand-name medications. One key implication for the above disparity in the context of cancer survivors following exposure to DTCA is the potential that some vulnerable groups may miss getting important additional relevant information for their treatment decision-making process. If so, a crucial gap may arise between those who are seeking information and those who do not seek external information following DTCA exposure, leading to widened disparities in downstream cancer outcomes.

To summarize, communication inequalities associated with cancer-related DTCA may arise at three distinct but related levels: 1) certain groups may be less likely to be exposed to DTCA, 2) differential attention and processing of DTCA may occur even with adequate exposure, and 3) some groups may not engage in additional information seeking after viewing DTCA. Arising from these inequalities, the concerns are that DTCA may have differential effects among certain social groups. For example, beneficial effects of DTCA information and knowledge may accrue disproportionately in one group and not in others. Conversely, detrimental effects of DTCA leading to inappropriate use of treatments may affect one group more than others due to differential processing and comprehension of the information. The net impact of these contingent effects is DTCA may exacerbate existing disparities in cancer outcomes.

The Current Study

Information-Seeking Behaviors in Cancer Survivors

This present study primarily addresses concerns arising from the third level of communication inequality described above—the potential for DTCA to generate higher levels of external information seeking behaviors in certain groups of cancer survivors and not others. Specifically, extending from the results in Studies 2 and 3 in this dissertation and relevant published literature, this study will assess the presence of moderation effects due to individual patient characteristics on the relationship between DTCA exposure and information-seeking behaviors (from clinicians and non-clinician sources). The four moderating factors tested in this study are 1) age, 2) educational attainment, 3) ethnicity, and 4) cancer type (by gender). Each of the research hypotheses and questions pertaining to these moderators is accompanied by justifications based on prior empiric evidence, where available, and a regression equation to illustrate the planned moderation analyses.

Age. Prior research is lacking on whether DTCA is associated with communication inequalities based on the age of cancer survivors. One study showed older cancer survivors receiving active treatment in a comprehensive cancer institute reported less awareness of DTCA of prescription cancer drugs (Abel et al., 2009). The analysis of predictors of DTCA exposure among Pennsylvanian cancer survivors (Study 2) was consistent in finding older cancer survivors reported lower levels of DTCA exposure. In addition, an earlier analysis by Nagler et al. (2010) reported older Pennsylvanian cancer survivors actively sought information about fewer topics related to their cancer and sought information from fewer sources compared to younger survivors, after adjusting for demographic and disease characteristics. In a study to assess age differences in consumer behaviors prompted by exposure to DTCA, DeLorme et al. (2006) found healthy older (65 years and older) and mature (45-64 years) participants were more likely than younger participants (18-44 years) to talk to a pharmacist about an advertised prescription drug. However, talking to a doctor, talking with friends or relatives, or searching for more information about an advertised drug did not differ significantly between participants in these age groups. Owing to the equivocal findings of the moderation effect of age, the following research questions were proposed:

Research Question 1: Does the association between DTCA exposure and patient clinician information engagement (PCIE) differ by age of cancer survivors?

$$\text{PCIE} = b_0 + b_1\ \text{DTCA} + b_2\ \text{Age} + b_3\ \text{DTCA*Age}$$

Research Question 2: Does the association between DTCA exposure and information-seeking from non-clinician sources (Seeking) differ by age of cancer survivors?

$$\text{Seeking} = b_0 + b_1\ \text{DTCA} + b_2\ \text{Age} + b_3\ \text{DTCA*Age}$$

Education. Educational attainment is another potential moderator of the relationship between DTCA and information engagement with physician sources. Abel et al. (2009) reported that among cancer patients undergoing active treatment for breast or hematologic malignancies, those without college education were *more* likely to report that DTCA (of prescription cancer medications) led to better discussions about health or medical care with their health provider compared to those with college education (65%

vs. 52%, p=.03). Based on this finding, one expectation would be education might interact with DTCA such that those with lower education would benefit *more* from exposure to DTCA in terms of additional information seeking. Conversely, prior studies indicate that DTCA content as well as the supplemental information in other forms tend to be at high difficulty reading levels (Chao, 2005; Kaphingst, Rudd, et al., 2004), which may in turn deter patients with lower educational levels from external information seeking. Therefore, a counter hypothesis would be DTCA has a *lower* effect on information seeking among survivors with lower education. Due to these competing hypotheses, the moderation effects of education are posed as research questions:

Research Question 3: Does the association between DTCA exposure and patient clinician information engagement (PCIE) differ between cancer survivors with higher education attainment and those with lower education attainment?

$$\text{PCIE} = b_0 + b_1\ \text{DTCA} + b_2\ \text{Education} + b_3\ \text{DTCA*Education}$$

Research Question 4: Does the association between DTCA exposure and information-seeking from non-clinician sources (Seeking) differ between cancer survivors with higher education attainment and those with lower education attainment?

$$\text{Seeking} = b_0 + b_1\ \text{DTCA} + b_2\ \text{Education} + b_3\ \text{DTCA*Education}$$

Ethnicity or race. As raised in the earlier discussion about inequalities in access and information processing, Kontos and Viswanath (2011) proposed social determinants including race and ethnicity may influence whether people seek additional information. There is however scant evidence or theoretical justification for ethnic or racial disparities in cancer communication behaviors above and beyond other important indicators of socio-economic status including education and household income. For instance, adjusting for household income, education, and employment, results from the 2007 HINTS indicated black and Hispanic adults were not significantly different from white adults in terms of having heard about genetic testing or finding medical statistics difficult to understand (Kontos & Viswanath, 2011). Moreover, results from the analysis in Study 2 were mixed with regards to race/ethnicity as a predictor of DTCA. Among breast cancer patients, there were no significant differences in reported exposure to DTCA between patients across groups. However, in patients diagnosed with prostate cancer, white patients reported *less* exposure to DTCA compared to black patients. Hispanic patients (and those who identified as being other than white or black) who were diagnosed with colorectal cancer reported less exposure to DTCA than white patients. Likewise, other large population studies have not found empirical evidence that ethnicity is associated with cancer information seeking behaviors. For instance, Hesse et al. (2008) reported ethnicity did not predict cancer survivors' level of information seeking, information source preference, information source use, or their information seeking experiences. This was corroborated by earlier findings from the Pennsylvanian Cancer Patient Survey that black and Hispanic cancer patients were similar in numbers of information sources and cancer topics they sought compared to white patients (Nagler, Gray, et al., 2010).

Furthermore, cancer patients' ethnicity was not associated with information seeking beyond that given by the health provider or with patients' level of health information seeking behaviors (HISB) for a variety of cancer-related topics (Galarce et al., 2011; Ramanadhan & Viswanath, 2006). Despite the above information, this study submits that research to understand the role of ethnicity in potentially moderating associations between DTCA and information seeking behaviors would be practically important and meaningful. Therefore, the assessment of ethnicity as a potential moderator proceeded with the following research questions:

Research Question 5: Does the association between DTCA exposure and patient clinician information engagement (PCIE) differ between cancer survivors of different ethnic groups (referent group is white)?

$$\text{PCIE} = b_0 + b_1\,\text{DTCA} + b_2\,\text{black} + b_3\,\text{Hispanic/other} + b_4\,\text{DTCA*black} + b_5\,\text{DTCA*Hispanic/other}$$

Research Question 6: Does the association between DTCA exposure and information-seeking from non-clinician sources (Seeking) differ between cancer survivors of different ethnic groups (referent group is white)?

$$\text{Seeking} = b_0 + b_1\,\text{DTCA} + b_2\,\text{black} + b_3\,\text{Hispanic/other} + b_4\,\text{DTCA*black} + b_5\,\text{DTCA*Hispanic/other}$$

Cancer type. Prior research based on the Cancer Patient Survey data found patients diagnosed with colon cancer consistently reported less information seeking from different sources when compared with breast and prostate cancer patients (Nagler, Gray, et al., 2010). The authors proposed these differences may be due to cancer-specific needs varying between patients diagnosed with these cancers and differing levels of relevant health information available in the overall media environment for each of these cancers. In addition, analysis of the predictors of DTCA (Study 2) found exposure to DTCA differed by gender and cancer types. Breast cancer patients reported more frequent DTCA exposure, more so than patients diagnosed with colon cancer or prostate cancer. These findings may be due to differences in availability of DTCA targeted at female and male patients or variations in levels of advertising targeted at specific types of cancer patients. In a content analysis of cancer-related DTCA of prescription drugs, Abel et al. (2007) found such DTCA in popular magazines were predominantly placed in women's magazines. In contrast, no cancer-related DTCA was found in any of the men's popular magazines analyzed in the study. The above observations warrant further assessment into whether communication inequalities pertaining to information seeking and DTCA exposure exist across patients diagnosed with specific cancers. Due to the lack of prior studies addressing this concern, the following research questions were posed to assess potential moderation effects of cancer type and gender:

Research Question 7: Does the association between DTCA exposure and patient clinician information engagement (PCIE) differ between survivors diagnosed with breast, colorectal, or prostate cancers (reference category is male colon cancer survivors)?

PCIE = b_0 + b_1 DTCA + b_2 Female colon cancer + b_3 (female) Breast cancer + b_4 (Male) Prostate cancer + b_5 DTCA*Female colon cancer + b_6 DTCA*Breast cancer + b_7 DTCA*Prostate cancer

Research Question 8: Does the association between DTCA exposure and information-seeking from non-clinician sources (Seeking) differ between survivors diagnosed with breast, colorectal, or prostate cancers (reference category is male colon cancer survivors)?

Seeking = b_0 + b_1 DTCA + b_2 Female colon cancer + b_3 Breast cancer + b_4 Prostate cancer + b_5 DTCA*Female colon cancer + b_6 DTCA*Breast cancer + b_7 DTCA*Prostate cancer

Method

Study Population

This study relies on data collected for the Cancer Patient Survey described in detail earlier in Studies 2 and 3. The present analyses will focus on data collected during baseline and follow-up surveys (conducted in 2006 and 2007).

Measures

The dependent variables are Patient-Clinician Information Engagement (PCIE) and information-seeking from non-clinician sources measured at baseline (Round 1) and in the follow-up (Round 2) survey as described in Study 3. Briefly, PCIE represents cancer survivors' reported engagement with their physicians and other health professionals on information related to their cancer and quality of life issues. The PCIE variable comprised survey items that asked participants if they actively looked for information about their cancer from their doctors or other health professionals. Conversely, seeking from non-clinician sources comprised items that asked participants to recall if they actively looked for information about their cancer and quality of life issues from 10 different lay interpersonal sources (i.e., family members, friends or co-workers; other cancer patients; face-to-face support groups; online support groups; or telephone hotlines) or media sources (i.e., television or radio; books, brochures or pamphlets; newspapers or magazines; internet other than personal email or online support groups; or other).

The independent variable is participants' exposure to DTCA since their cancer diagnosis measured at baseline (ranges from 9 to 21 months from diagnosis). As described in earlier chapters, this is operationalized as self-reported DTCA exposure and comprises ads about treatment alternatives for cancer, dealing with side effects of treatment, and hospitals or doctors offering services for cancer. The DTCA exposure measure is formed from the average of individuals' responses to each of the three survey items.

Four moderating variables are tested in these analyses. They include age at cancer diagnosis (measured in years), highest educational attainment (some high school and below, high school or GED, some college, and college and above), ethnicity (white, black, or Hispanic and other), and cancer type (male colon cancer, female colon cancer, breast cancer, prostate cancers).

Analyses

The analyses include cross-sectional multiple regressions (associations with PCIE and seeking from non-clinician sources at Round 1) and lagged multiple regressions (predicting PCIE and seeking at Round 2 while controlling for these behaviors at Round 1) to assess moderating roles of individual predictors described in the hypotheses and research questions above. Individual moderators are tested by introducing interaction terms between a moderating variable and DTCA exposure as implied in each of the 8 research questions. For each model, the main effects of the other moderators were included even when they were not the moderator of interest. As an example, in evaluating Research Question 1 (moderation by age analysis), education, ethnicity, and cancer type were included in the model as covariates. In addition, other potential confounders were included in the regression models (cancer stage at diagnosis, Lerman cancer worry scale, and self-reported health status).

The rationale for testing the presence of moderation by these covariates in both cross-sectional and lagged models was threefold. First, the interactions between DTCA and each of the covariates might influence more immediate health information seeking behaviors in survivors. Performing the cross-sectional tests would permit the ability to detect such short-term impacts. However, cross-sectional analyses are limited in terms of establishing causal direction of the associations. Therefore, the second rationale for including lagged models was to strengthen causal inferences by addressing concerns about temporal precedence of predictors in relation to PCIE and seeking from non-clinician sources. Third, patterns of moderation by the four covariates may differ over time. Moderation analyses for PCIE and seeking from non-clinician sources at baseline and follow-up would provide additional insights of such possibilities.

To address the presence of missing values in the predictor variables, the Mplus software (Muthén & Muthén, 1998) was utilized to fit full information maximum likelihood (FIML) models. The majority of missing values occurred in the DTCA exposure variable because of 369 participants who were randomly assigned to answer a shortened version of the survey at Round 1 that excluded items about DTCA exposure. The models further applied post-stratification sample weights to adjust the final sample to represent the Pennsylvania Cancer Registry patient population diagnosed with breast, prostate, or colorectal cancers in terms of race/ethnicity, age, gender, marital status, time of diagnosis, and stage at diagnosis. These weights also adjusted for survey non-response and accounted for the oversampling of certain subgroups of patients.

Preliminary univariate analyses revealed that the distribution of the key variables (DTCA exposure, PCIE, and information seeking from non-clinician sources) were non-normal (skewness ranged from -0.058 to 1.040; kurtosis ranged from -0.882 to 0.498; all univariate Shapiro-Wilk tests were significant at p<0.0005). Huber-White covariance adjustments were applied to the estimated standard errors as these are robust to non-normality in the data.

Results

Table 6.1 summarizes the characteristics of the study population at Round 1 and Round 2 including the four moderating variables and additional covariates measured at Round 1. The average age of the sample in Round 1 was 66 years, 44% had some college education or higher, 83% were white, and 71% had early stage cancer (stages 0 to II). These characteristics of the sample who participated at Round 2 were similar. Participation in Round 2 was higher among patients who were white (versus African-American) or those who had higher education levels (versus some high school or below), stage 0 to 2 disease (versus stage 4), lower Lerman worry, or higher health status. Summary statistics for DTCA exposure, PCIE, and information seeking from non-clinician sources are displayed in Table 6.2. Post-stratification sample weights were applied to adjust the analyzed samples in Round 1 and Round 2 to represent the Pennsylvania Cancer Registry patient population in the moderation analyses.

Table 6.1 Characteristics Of Study Population At Round 1 and 2

		Round 1 (N=2013)			Round 2 (N=1293)		
	Range	Mean	SD	%	Mean	SD	%
Age at round 1 (years) [a]	24 to 105	66.2	12.4		65.5	11.9	
Education[b]							
Some high school or below				15.8			12.8
High school or GED				40.7			39.5
Some college or 2 year degree				21.9			22.5
College degree and above				21.6			25.0
Race/Ethnicity							
White				83.1			86.2
African-American				12.8			10.4
Hispanic or other race/ethnicity				4.2			3.4
Cancer Type[c]							
Male colon cancer				16.7			15.4
Female colon cancer				17.1			16.6
Breast cancer				33.7			34.8
Prostate cancer				32.3			33.3
Lerman Cancer Worry Scale at round 1[d]	1 to 5	2.43	1.00		2.35	0.97	
Cancer Stage[e]							
Stage 0 to II				71.0			73.8
Stage III				12.9			13.0
Stage IV				16.1			13.2
Health Status at round 1[f]	1 to 5	3.11	0.94		3.22	0.9	

Notes. Missing values at round 1: [a]1; [b]34; [c]3 (gender was unknown for three patients); [d]62; [e]132; [f]113. Missing values at round 2: [a]0; [b]3; [c]0; [d]29; [e]77; [f]60.

Table 6.2 Summary Statistics Of Key Variables

	Range	Mean	SD
Exposure to DTCA at round 1[a]	1 to 5	2.41	1.02
Patient-clinician information engagement (PCIE) at round 1[b]	0 to 1	0.51	0.29
Patient-clinician information engagement (PCIE) at round 2[c]	0 to 1	0.29	0.28
Information seeking from non-clinician sources at round 1[d]	0 to 1	0.20	0.17
Information seeking from non-clinician sources at round 2[e]	0 to 1	0.14	0.16

Notes. n=2013 at round 1 and n=1293 at round 2.
Missing values: [a]508 (369 participants were not asked these items because they were randomly selected to receive a short form of the survey that omitted these items); [b]26; [c]14; [d]20; [e]14.

Results of the cross-sectional and lagged moderation analyses are summarized in Tables 6.3 through 6.6. The parameters of note are the respective interaction terms between DTCA exposure and each of the four moderating variables. The cross-sectional analyses indicated that controlling for potential confounders, age, educational level, race/ethnicity, and cancer type did not significantly moderate the association between DTCA exposure and PCIE or information seeking from non-clinician sources at Round1. Similarly, based on the lagged analyses controlling for PCIE or information seeking from non-clinician sources at Round 1, no significant moderation was detected in the associations between DTCA exposure and these information engagement behaviors at Round 2 by the four moderators investigated here.

Table 6.3 Cross-Sectional And Lagged Moderation Analyses By Age

Cross-sectional analyses (n=2010)	PCIE at round 1			Seeking from non-clinician sources at round 1		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.023	-0.055 - 0.102	0.559	0.049	0.006 - 0.091	0.026
Age (years)	-0.004	-0.007 - -0.001	0.022	-0.003	-0.004 - -0.001	0.002
DTCA by age	0.000	-0.001 - 0.001	0.670	0.000	-0.001 - 0.000	0.572
Lagged analyses (n=1293)	PCIE at round 2			Seeking from non-clinician sources at round 2		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.061	-0.031 - 0.154	0.194	0.038	-0.014 - 0.089	0.152
Age (years)	0.002	-0.002 - 0.006	0.285	0.001	-0.001 - 0.003	0.184
DTCA by age	-0.001	-0.002 - 0.001	0.444	0.000	-0.001 - 0.000	0.268

Notes. B = unstandardized regression coefficients estimated using full information maximum likelihood and adjusted with post-stratification weights; 95% CI = 95% confidence intervals based on Huber-White standard errors; baseline post-stratification weights could not be computed for 3 cases because of missing information about gender and these cases were dropped from the cross-sectional analyses, resulting in an analyzed sample of 2010; cross-sectional analyses adjusted for age, education, race/ethnicity, cancer type, Lerman worry, cancer stage, and health status; lagged analyses adjusted for the same covariates as well as PCIE or seeking from non-clinician sources at round 1.

Table 6.4 Cross-Sectional And Lagged Moderation Analyses By Highest Educational Level

Cross-sectional analyses (n=2010)	PCIE at round 1			Seeking from non-clinician sources at round 1		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.020	-0.033 - 0.072	0.464	0.032	0.010 - 0.054	0.004
Some high school or below (referent)	-			-		
High school or GED	-0.062	-0.199 - 0.074	0.371	0.011	-0.044 - 0.067	0.694
Some college or 2 year degree	-0.059	-0.205 - 0.087	0.429	0.007	-0.052 - 0.066	0.816
College degree and above	0.090	-0.062 - 0.242	0.247	0.064	-0.001 - 0.129	0.054
DTCA by high school	0.028	-0.028 - 0.084	0.323	0.002	-0.024 - 0.027	0.903
DTCA by some college	0.036	-0.022 - 0.095	0.227	0.015	-0.011 - 0.042	0.255
DTCA by college and above	0.012	-0.050 - 0.073	0.710	0.001	-0.028 - 0.031	0.927
Lagged analyses (n=1293)	PCIE at round 2			Seeking from non-clinician sources at round 2		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.026	-0.020 - 0.071	0.271	0.001	-0.021 - 0.022	0.937
Some high school or below (referent)	-			-		
High school or GED	-0.002	-0.137 - 0.134	0.982	-0.018	-0.079 - 0.043	0.561
Some college or 2 year degree	0.065	-0.080 - 0.210	0.379	-0.002	-0.066 - 0.063	0.954
College degree and above	0.016	-0.131 - 0.163	0.829	-0.011	-0.082 - 0.061	0.769
DTCA by high school	0.000	-0.054 - 0.053	0.987	0.010	-0.015 - 0.035	0.448
DTCA by some college	-0.010	-0.064 - 0.045	0.734	0.010	-0.016 - 0.036	0.451
DTCA by college and above	0.009	-0.049 - 0.067	0.762	0.011	-0.018 - 0.040	0.470

Notes. B = unstandardized regression coefficients estimated using full information maximum likelihood and adjusted with post-stratification weights; 95% CI = 95% confidence intervals based on Huber-White standard errors; baseline post-stratification weights could not be computed for 3 cases because of missing information about gender and these cases were dropped from the cross-sectional analyses, resulting in an analyzed sample of 2010; cross-sectional analyses adjusted for age, education, race/ethnicity, cancer type, Lerman worry, cancer stage, and health status; lagged analyses adjusted for the same covariates as well as PCIE or seeking from non-clinician sources at round 1.

Table 6.5 Cross-Sectional And Lagged Moderation Analyses By Race/Ethnicity

Cross-sectional analyses (n=2010)	PCIE at round 1			Seeking from non-clinician sources at round 1		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.041	0.022 - 0.061	<0.001	0.034	0.024 - 0.044	<0.001
White (referent)	-			-		
Black	0.009	-0.118 - 0.135	0.892	-0.041	-0.109 - 0.028	0.247
Hispanic or other	-0.025	-0.223 - 0.172	0.801	-0.013	-0.117 - 0.091	0.804
DTCA by Black	-0.006	-0.049 - 0.037	0.790	0.016	-0.009 - 0.042	0.210
DTCA by Hispanic	0.006	-0.073 - 0.085	0.888	0.012	-0.031 - 0.055	0.576
Lagged analyses (n=1293)	PCIE at round 2			Seeking from non-clinician sources at round 2		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.025	0.006 - 0.045	0.010	0.011	0.001 - 0.021	0.024
White (referent)	-			-		
Black	0.115	-0.022 - 0.253	0.100	0.101	0.018 - 0.184	0.017
Hispanic or other	0.011	-0.162 - 0.183	0.904	0.034	-0.152 - 0.220	0.720
DTCA by Black	-0.010	-0.057 - 0.037	0.680	-0.022	-0.050 - 0.006	0.121
DTCA by Hispanic	0.006	-0.061 - 0.073	0.860	-0.008	-0.075 - 0.060	0.826

Notes. B = unstandardized regression coefficients estimated using full information maximum likelihood and adjusted with post-stratification weights; 95% CI = 95% confidence intervals based on Huber-White standard errors; baseline post-stratification weights could not be computed for 3 cases because of missing information about gender and these cases were dropped from the cross-sectional analyses, resulting in an analyzed sample of 2010; cross-sectional analyses adjusted for age, education, race/ethnicity, cancer type, Lerman worry, cancer stage, and health status; lagged analyses adjusted for the same covariates as well as PCIE or seeking from non-clinician sources at round 1.

Table 6.6 Cross-Sectional And Lagged Moderation Analyses By Gender And Cancer Type

Cross-sectional analyses (n=2010)	PCIE at round 1			Seeking from non-clinician sources at round 1		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.049	-0.002 - 0.100	0.060	0.037	0.014 - 0.060	0.002
Male colon cancer (referent)	-			-		
Female colon cancer	0.046	-0.104 - 0.195	0.549	0.039	-0.030 - 0.109	0.267
Breast cancer	0.084	-0.049 - 0.218	0.216	0.099	0.040 - 0.157	0.001
Prostate cancer	0.156	0.028 - 0.283	0.017	0.033	-0.023 - 0.090	0.251
DTCA by female colon cancer	-0.029	-0.094 - 0.036	0.377	-0.009	-0.043 - 0.024	0.584
DTCA by breast cancer	-0.007	-0.064 - 0.050	0.808	-0.011	-0.038 - 0.016	0.427
DTCA by prostate cancer	-0.001	-0.059 - 0.057	0.982	0.020	-0.008 - 0.049	0.165
Lagged analyses (n=1293)	PCIE at round 2			Seeking from non-clinician sources at round 2		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.016	-0.027 - 0.059	0.470	-0.006	-0.024 - 0.013	0.552
Male colon cancer (referent)	-			-		
Female colon cancer	-0.035	-0.179 - 0.108	0.629	-0.034	-0.097 - 0.029	0.291
Breast cancer	0.033	-0.094 - 0.160	0.610	-0.045	-0.101 - 0.010	0.106
Prostate cancer	0.008	-0.124 - 0.141	0.902	-0.058	-0.116 - 0.001	0.053
DTCA by female colon cancer	0.036	-0.025 - 0.097	0.252	0.025	-0.002 - 0.052	0.070
DTCA by breast cancer	0.004	-0.045 - 0.054	0.868	0.018	-0.005 - 0.040	0.121
DTCA by prostate cancer	0.008	-0.046 - 0.063	0.769	0.016	-0.010 - 0.042	0.239

Notes. B = unstandardized regression coefficients estimated using full information maximum likelihood and adjusted with post-stratification weights; 95% CI = 95% confidence intervals based on Huber-White standard errors; baseline post-stratification weights could not be computed for 3 cases because of missing information about gender and these cases were dropped from the cross-sectional analyses, resulting in an analyzed sample of 2010; cross-sectional analyses adjusted for age, education, race/ethnicity, cancer type, Lerman worry, cancer stage, and health status; lagged analyses adjusted for the same covariates as well as PCIE or seeking from non-clinician sources at round 1.

Discussion

This research was conceptualized based on the premise that communication disparities may arise as a result of differential levels of cancer-related DTCA exposure, attention and processing, or additional information seeking following exposure as described in the Structural Influence Model of Communication. The series of studies presented in this dissertation project thus far examined various aspects of this underlying premise of communication disparities. Study 2 analyzed the predictors of DTCA exposure to evaluate if exposure differed based on several patient characteristics. Study 3 focused on testing the hypotheses that DTCA exposure was associated with additional information seeking behaviors. Building upon Studies 2 and 3, Study 4 explored whether the associations between DTCA and seeking behaviors were contingent upon patients' age, education, race/ethnicity, or cancer type.

The findings from these three studies reveal interesting insights into the postulated communication disparities of DTCA in terms of exposure levels and additional information seeking. Study 2 found that breast cancer patients reported more DTCA exposure than prostate and colorectal cancer patients; older patients had lower exposures than younger patients; African-American prostate cancer patients had higher exposures than white patients; and Hispanic colorectal cancer patients reported lower exposures than white patients. These findings supported the notion that there are differential levels of DTCA exposure across patient subgroups within this study population. Study 3 further described a significant lagged association between DTCA exposure and patients' active information seeking from their clinicians at follow-up; the association between DTCA exposure and active seeking from non-clinician sources was positive but marginally significant. Study 4 found that age, education, race/ethnicity, or cancer type did not moderate the associations between exposure to DTCA and active information seeking behaviors in the cross-sectional or lagged analyses. Taken together, it can be concluded that although DTCA exposure varied by patient characteristics, there was little evidence to warrant concern that DTCA exposure was associated with communication disparities associated with differential additional information seeking between patient subgroups.

In response to concerns about DTCA resulting in communication disparities in cancer patients and exacerbating cancer outcomes disparities, results from Study 4 provide empirical evidence that is reassuring. These findings are likely to contribute to the ongoing practice and policy debates surrounding DTCA of medical treatments in a few ways. First, although DTCA of medical treatments have existed and attracted much debate and research in the past three decades, few studies have been conducted to systematically examine social inequalities of communication behaviors and health outcomes in association with DTCA exposure. This current research represents an attempt to evaluate the issue of communication disparities in DTCA in the specific context of cancer treatment. Second, contrary to claims that DTCA exposure might result in disadvantaged groups of patients to be disproportionately less informed about their treatment because they do not seek additional health information, this population-based study among colorectal, breast, and prostate cancer patients found little indication that

DTCA exposure influenced differential levels of active information seeking from clinicians or non-clinician sources. Rather, DTCA exposure was significantly associated with improved patient-clinician information engagement (results from Study 3) and this relationship was similar across the different patient characteristics tested in the present study.

It is important to stress here that the findings in this research should not be taken to infer that DTCA does not contribute to any disparities in cancer outcomes. Notably, this study only analyzed one form of communication behavior (active information seeking) as the outcome. It did not assess whether attention or information processing of DTCA messages—one of the levels of communication disparities in the Structural Influence Model—differed across patient characteristics. Furthermore, the study did not consider other important outcomes (e.g., healthcare utilization or health outcomes) that might differ following DTCA exposure or other important social determinants as potential moderators (e.g., access to healthcare, socio-economic position, or social capital). This study was constrained by the availability of survey information relevant for studying these outcomes and moderating variables. Future research will be necessary to examine if DTCA exposure might produce or widen disparities in other important cancer outcomes and across additional patient characteristics.

There were other limitations in this study that deserve mention. First, the study was limited to cancer patients who were diagnosed with colorectal, breast, or prostate cancers. Because of the diversity in the availability and complexity of treatments for other forms of cancers, the lack of supporting evidence for communication disparities in this study population may not necessarily apply to other cancer patients. In addition, the study also pertains to the specific context of cancer-related DTCA and active information seeking about cancer care. The results may differ for other forms of DTCA and health conditions. A second limitation in this study was the reliance on self-reported measures for exposure to DTCA and the information seeking behavior measures. These may be subject to social desirability bias to misreport recalling DTCA exposure or seeking behaviors in certain patient groups and result in attenuation of contingent effects. Third, there was an underrepresentation of cancer patients from certain groups (e.g., patients who were Hispanic or of other race/ethnicity). This may have restricted the ability to obtain reliable estimates of the associations between DTCA and information seeking behaviors in these groups and reduced the statistical power to detect significant contingent effects.

The study was strengthened by the multi-wave cohort design which enabled testing the presence of communication disparities at baseline and at round 2. This was important in testing for both short and longer term communication disparities associated with DTCA that would not be possible with a cross-sectional survey. Compared to prior DTCA research involving convenience samples of cancer patients (e.g., within a single treatment facility), this study invited a population-based sample from the Pennsylvania Cancer Registry. While not generalizable to cancer patients across the United States, the results here could be viewed as representative of Pennsylvanian cancer patients with the most commonly occurring cancers (i.e., colorectal, breast, and prostate).

In sum, this study analyzed the effects of cancer patients' exposure to DTCA on subsequent active information seeking behaviors across various characteristics based, drawing from levels of communication disparities described in the Structural Influence Model of Communication. Contrary to concerns about potential communication disparities due to cancer-related DTCA, the analyses here did not indicate that the association between DTCA exposure and active information seeking behaviors were contingent on patients' age, educational level, race/ethnicity, or cancer type. This study provides empirical research to inform the ongoing policy debates on the utility of DTCA as a form of public health communication.

Chapter 7 DISCUSSION AND LIMITATIONS

Discussion

The practice of DTCA is likely to endure in the foreseeable future, not only in the specific context of cancer treatment, but also for promoting novel treatments or medical services targeting other health conditions. This trend will invariably trigger further debates concerning the risks and benefits of DTCA as a ubiquitous source of public health information.

This dissertation research contributes to the broader debate about DTCA in multiple ways. First, it offers empirical evidence that enhances the understanding of implications of cancer-related DTCA exposure on cancer patients' health information seeking behaviors. Second, it further explores potential communication disparities that may arise from DTCA exposure. The key findings can be summarized as follows:

- The present research suggests there are positive informational spillover effects of DTCA exposure about cancer-related treatments in terms of increased patients' health information engagement with their physicians and other healthcare professionals. While it is recognized that these communication behaviors overlap with patients' inquiry about advertised cancer treatments to a small extent, these behaviors are believed to involve a broader range of cancer-related health topics that would be relevant and potentially beneficial for patients' ability to manage and cope with their condition. The finding that DTCA exposure is associated with higher levels of patient-clinician communication is therefore reassuring given that previous research strongly suggests effective communication is an important determinant of improved patient outcomes and constitutes a core component of a patient-centered model in healthcare delivery.

- Guided by the Integrative Model, a focused analysis involving one form of information seeking behavior—active seeking from non-clinician sources—provides new evidence that DTCA exposure may indirectly influence information seeking through attitudes and intentions related to seeking from these sources, even though the direct effect between DTCA and seeking from non-clinician sources was marginally significant. This finding offers theoretical insights into one possible underlying mechanism of how DTCA exposure impacts patients' health information seeking behaviors and contributes to the understanding of communication effects of DTCA.
- Addressing concerns about potentially harmful communication disparities arising from DTCA, this research observed mostly small differences in terms of exposure levels to cancer-related DTCA across patient characteristics including cancer type, age, race/ethnicity, and cancer stage. Apart from age, the correlates of DTCA exposure were inconsistent between patients diagnosed with different cancer types. There are several underlying reasons for these minor variations in the frequency of reported DTCA exposure across patient groups. As suggested from a review of the literature, differential advertising spending on treatments for

the three cancer types or selective placement of ads in channels to target certain demographic groups of patients may result in varying opportunities for being exposed to DTCA in some patients. The variations in reported DTCA exposure may also arise from disparities in gaining access to channels where DTCA are commonly placed (e.g., lack of internet access hindering exposure to cancer treatment advertising through web-based ad) or differences in overall media consumption patterns across groups such that some patients tend to report higher DTCA exposure.

- Apart from the findings of modest differential levels of DTCA exposure in some groups of cancer patients, this research did not identify compelling evidence to suggest that DTCA exposure contributes to disparities in additional information seeking across these individual patient characteristics. Contrary to hypothesized communication disparities proposed in the Structural Influence Model, the associations between DTCA and active information seeking behaviors (from clinicians and non-clinician sources) were not contingent on cancer type, age, educational attainment, or race and ethnicity. It should be cautioned, however, that these null results do not imply that DTCA is therefore harmless in terms of inequalities in other communication or downstream cancer outcomes. The impact of DTCA on these outcomes poses empirical questions that remain unanswered at this juncture and would require further investigation. Despite this caveat, the present study concludes that there is minimal cause for concern that DTCA exposures may propagate divergent patterns of seeking about cancer-related information across groups in this study population.

An additional contribution from this dissertation project to studying DTCA effects includes the methodological approaches described here. First, the assessment of the reliability and validity of various measurement options for the DTCA exposure variable using a battery of criteria may be adapted in future research to design and test candidate measures that are appropriate for assessing exposure to other forms of subspecialty DTCA in various health domains. Second, this research explored theoretical mechanisms of DTCA effects on information seeking behaviors based on the Integrative Model constructs using structural equation modeling. This theoretically grounded approach has the potential to assist future research in explicating meaningful psychosocial pathways of DTCA's effects on patient communication behaviors, patient-provider relationships, and ultimately health outcomes.

Strengths and Limitations

The study is strengthened by a few design features. First, the present research emphasizes an assessment of the quality of the DTCA exposure measure across different reliability and validity criteria as a prerequisite for subsequent analyses on the impact of DTCA on communication outcomes. The validation study compared the performance of existing survey items of DTCA with alternative versions that were more elaborate (with text explanations or ad exemplars) and replicated the validation based on data collected from two different samples of cancer patients (a probability-based sample of patients from a single state versus a national sample from an opt-in survey panel). This provides increased confidence that the DTCA exposure measure is reasonably reliable and performs consistently in different cancer patient populations before proceeding to utilize this measure in the various analyses in Studies 2 to 4.

Second, the principal measures for DTCA exposure and information seeking behaviors are conceptualized more broadly compared to previous research. In the case of DTCA exposure, the measure incorporates exposure to ads about alternative cancer treatments, dealing with treatment side-effects, and healthcare providers; this contrasted with the majority of past research that focuses almost exclusively on exposure to DTCA of prescription drugs alone. The broader DTCA exposure may be viewed as a better reflection of the growing presence of non-drug related ads in cancer treatment and other subspecialty DTCA. Also, the information seeking measures integrate multiple cancer-related topics that are most salient for cancer patients; this allows for analyses of the impact of DTCA exposure on broader information seeking compared with earlier studies that focused primarily on patients' inquiry about an advertised medication alone.

Another crucial feature in this research study includes the ability to measure patient communication behaviors and DTCA exposure in a large and representative sample of cancer patients over time. First, in terms of the sampling strategy, the probability-based sample of cancer patients from the Pennsylvania Cancer Registry is an improvement from past surveys that tended to involve convenience samples of cancer patients attending a single clinic or cancer center at one time point. While not generalizable to cancer patients across the United States, the results here could be viewed as representative of Pennsylvanian cancer patients with the most commonly occurring cancers (i.e., colorectal, breast, and prostate). Second, the longitudinal design in this research enables testing for both short and longer term communication disparities in association with DTCA that is not possible within a cross-sectional survey. The panel design further affords the capacity to clarify the temporal order between patients’ DTCA exposures at an earlier time point and subsequent information seeking behaviors. In addition, the lagged analyses control for underlying seeking habits or motivation by adjusting for previously reported seeking behaviors.

However, a few limitations in this research deserve mention and these may be addressed in future studies. The first limitation concerns the fact that all the principal variables are based on self-reported survey items. Inherent to survey research, self-reported measures may be subject to recall biases arising from unreliable memory of actual exposures or seeking behaviors or social desirability for instance. While this research includes a validation of the DTCA exposure measure with alternative survey items, further research may be necessary to externally validate this self-reported measure. For instance, future studies may compare patients’ self-reported DTCA exposure over time with aggregate-level data sources of ad expenditures by manufacturers of cancer-related medications or cancer centers.

Likewise, the information seeking measures rely on patients' recall of active seeking about various topics. These measures may suffer from imprecision because much information exchange occurs between patients and their clinicians in the course of patients' treatment and follow-up. As reviewed earlier, cancer patients also seek from a wide number of information sources apart from their clinicians. Patients may not be expected to recall these exchanges or seeking of topics from multiple sources with great accuracy over a long period of time (e.g., over 12 months). The established literature on patient-doctor communication provides ample means of capturing dyadic interactions accurately in small settings (e.g., direct observation, audio or video recording, and use of standardized patients) but these methods are prohibitively difficult to apply on a large scale. The limitations of self-reported measures are therefore compromises in exchange for the ability to describe the patterns of DTCA exposure and information seeking in a large and representative sample of patients.

Another related measurement issue is the timing of the information seeking measures one year after DTCA exposure. It is possible that effects on additional information seeking may occur soon after DTCA exposure and therefore, the follow-up measure of information seeking may not detect this relationship appropriately. However, baseline reports of DTCA exposure may serve as an estimate of continuing DTCA exposure throughout the intervening year, coinciding with the period of recall about information seeking behaviors. Future research may require shorter intervals of follow-up surveys to assess information seeking effects following DTCA exposure in a timely manner.

A further limitation relates to generalizability of the findings. As the study population was restricted to cancer patients with three types of cancer (i.e., breast, prostate, and colorectal cancer) from one state, it is plausible that different patterns in DTCA exposure and communication behaviors may occur for other cancer patients or in other regions. In the case of DTCA exposures, promotional ads for cancer treatment may be more prevalent in geographic regions where there is intense competition between cancer centers and hospitals (e.g., in the mid-Atlantic region) compared with regions where there is less competition. Access to information sources may also differ between patients across the U.S. (e.g., rural versus urban areas) and this may pose barriers for patients to actively conduct information seeking from their clinicians or other sources following exposure to DTCA. These issues merit further study to assess if the observed findings in this research would differ in other cancer patient populations.

Although the panel design of the study among cancer patients from the Pennsylvania Cancer Registry is helpful in clarifying the temporal order of DTCA exposure and information seeking behaviors, there is may be unmeasured confounders that explain the observed associations. For instance, patients’ underlying need for information may influence their attentiveness to DTCA as well as their active information seeking about their condition from different sources. While several covariates including past seeking behaviors are included in these analyses to account for patients’ interest and motivation to seek information, the threat that a causal inference from the association between DTCA and active information seeking may be spurious remains due to the observational study design. One suggestion is for future studies to consider examining the hypothesized relationship between DTCA exposure and patient information seeking behaviors by analyzing the associations between naturally occurring variations in DTCA expenditures across different regions and these communication behaviors.

Future Research Directions

This dissertation research provides the starting point for developing a program of research to address additional questions surrounding the impact of DTCA as a form of public health communication. One continuing concern is to build a theoretically driven understanding of DTCA effects on communication behaviors, drawing from this research and previous literature based on relevant constructs described in the Social Cognitive Theory, Integrative Model, and other frameworks. Study 3 indicates that attitudes and perceived normative pressure to engage in information seeking from sources other than one's physician may mediate DTCA effects on cancer patients' seeking from such sources. Perceived behavioral control, however, did not mediate this relationship. One future research direction is to explore the roles of other theoretical constructs suggested by earlier research (e.g., shared decision making preferences (Deshpande et al., 2004)) in mediating DTCA effects on patient information seeking behaviors. This will enrich the understanding of underlying mechanisms of DTCA's impact on these important communication behaviors.

Another future research direction is aimed at investigating the impact of DTCA during the first few months following patients' cancer diagnoses. The study population in this research participated in the first survey about 9 to 21 months following the initial cancer diagnosis. In an earlier cross-sectional study within one institution, Abel and colleagues (2009) surveyed cancer patients (diagnosed with breast cancer and hematologic malignancies) who were already undergoing active treatment about their opinions of DTCA of cancer-related prescription medications. In both instances, the studies are limited by the timing of the surveys—data collection began after treatment decisions have been made. In other words, for the surveys described in this dissertation, most of the patients had already completed or were undergoing active treatment for their cancer by the time they completed the first survey. Accordingly, while the analyses indicate that DTCA exposure is associated with subsequent information seeking behaviors, it is not possible to assess whether DTCA exposure influences cancer patients' treatment decision process because of the timing of the survey in relation to their receipt of treatment. Similarly for the study by Abel et al. (2009), participants were already receiving treatment at the point of the survey data collection. Therefore, the temporal order of events (DTCA exposure and treatment decision making) could not be distinguished. Research is lacking in assessing if cancer-related DTCA is associated with patients' treatment decision processes as they weigh the risks and benefits of treatment options. One suggestion to explore this relationship may involve interviewing a representative sample of newly diagnosed cancer patients (within 3 months of diagnosis;

because most patients make treatment decisions in the first few weeks following diagnosis and complete treatment within 6 months) to assess their exposure to DTCA exposure during this period in relation to their subsequent decision making and receipt of various treatment options. The proposed study would involve longitudinal surveys among newly diagnosed cancer patients within 3 months of diagnosis and followed up over one year. Survey items on DTCA exposure may be adapted from previously validated scales and published questionnaires (from the Pennsylvania Cancer Patient Survey described here and others including Weissman et al. (2003) and Abel et al. (2009)) while survey items on treatment decision making processes would derive from established scales (e.g., patient involvement scale (Katz et al., 2005), patient decisional conflict scale, or patient satisfaction with decision making subscale (O'Connor, 1995)). Additionally, receipt of treatment may be obtained from patient self-reports or extracted from medical records at follow-up.

Conclusion

DTCA is an established and growing source of novel information about treatment for patients with complex medical conditions including cancer. The findings from this research provide the first steps to uncovering the impact of DTCA as a unique form of public health communication on cancer patients' information seeking from their clinicians and other sources. Stakeholders involved in the ongoing debate about the societal implications of DTCA may need to consider the potential role for DTCA in influencing additional information seeking behaviors among patients and balancing this with concerns about disparities in communication or cancer outcomes that may arise due to DTCA exposure. More research is advised to fully understand the consequences and harness the benefits of DTCA appropriately in the context of a rapidly evolving healthcare environment.

Appendix A Survey Questionnaire for Study 1B

[Programming instruction: These are the screening questions for the survey]

Variable name	
Age	How old are you? _______ years old.

[Programming instruction: If 21 years and older, proceed to the next question. If 20 years and younger, screen out as ineligible]

Variable name	
Yeardx	When were you diagnosed with cancer?

1	2012
2	2011
3	2010
4	Others: Specify _______________________

[Programming instruction: If either 2012, 2011, or 2010, proceed to the next question. If diagnosed earlier than 2010, screen out as ineligible]

Variable name	
setup	During this survey, you may be requested to view short video clips. In order to view the clips, you should have Adobe Flash Player installed on your computer and the speakers should be turned on during the survey. Please note that some mobile devices might not be able to play Flash videos. Please click on the button below to test if you are able to hear the following audio clip. Were you able to hear the audio clip clearly?

No	0	[Programming instruction: Route to end of survey, consider ineligible]
Yes	1	[Programming instruction: Proceed to next item]

[Instructions for participants: Please answer each of the following questions by selecting the number that best describes your experience. Some of the questions may appear to be similar, but they do address somewhat different topics. Please read each question carefully.]

PART I ITEMS (3 QUESTIONS – ASK ALL PARTICIPANTS)

[Programming instruction: Randomize half of participants to get PART I items first followed by PART IA, then PART II or III; Randomize the other half of participants to get PART II or III items first, then PART IA, followed by PART I items]

[Programming instruction: All questions are required; participants will not be able to proceed if they do not answer all the items. If participants leave out answers for an item on the screen, display the following message: “Please answer all the items before proceeding.”]

Since your diagnosis, how often have you seen or heard **advertisements** concerning each of the following? *Check all that apply*:

Variable name		Never	Less than every month	About twice a month	About once a week	Almost every day
cps_treatalt	Treatment alternatives for your cancer	0	1	2	3	4
cps_sideeff	Dealing with side effects of treatment	0	1	2	3	4
cps_hospdoc	Hospitals or doctors offering services for cancer	0	1	2	3	4

PART IA ITEMS (ASK ALL PARTICIPANTS)

The questions in the next pages explore different situations.

- Sometimes you might have been **actively looking** for information about a specific cancer topic (e.g., treatment).
- Other times you might **not have been looking** for cancer information at all, but **just came across it**.

Please note what each question asks about.

Variable name		
		Did you **actively look** for information about your cancer (about treatments but also about other topics) from any sources since your diagnosis?
Noseek	☐	I did not actively look for information about my cancer since my diagnosis.
		I did **actively look** for information about my cancer since my diagnosis from the following sources *(Check all that apply)*:
Seektreatdoc	☐	My treating doctors

Seekothdoc	☐	Other doctors or health professionals
Seekfam	☐	Family members, friends, coworkers
Seekpat	☐	Other cancer patients
Seekfacegp	☐	Face-to-face support groups
Seekonlinegp	☐	On-line support groups
Seektvrad	☐	Telephone hotlines (e.g. from the American Cancer Society)
Seekhotline	☐	Television or radio
Seekbook	☐	Books, brochures or pamphlets
Seeknews	☐	Newspapers or magazines
Seekinternet	☐	Internet (other than personal email and on-line support groups)
Seekoth	☐	Other

Variable name		
		Sometimes people get information from other sources and discuss it with their treating doctors. Where have you gotten information that you **<u>discussed with your treating doctors</u>** since your diagnosis?
Nodiscuss	☐	I have not discussed information from another source with my treating doctors since my diagnosis.
		I have discussed information with my treating doctors that I got

		from the following sources *(Check all that apply)*:
discussothdoc	☐	Other doctors or health professionals
discussfam	☐	Family members, friends, coworkers
discusspat	☐	Other cancer patients
discussfacegp	☐	Face-to-face support groups
discussonlinegp	☐	On-line support groups
discusstvrad	☐	Telephone hotlines (e.g. from the American Cancer Society)
discusshotline	☐	Television or radio
discussbook	☐	Books, brochures or pamphlets
discussnews	☐	Newspapers or magazines
discussinternet	☐	Internet (other than personal email and on-line support groups)
discussoth	☐	Other

Variable name		
		Sometimes doctors suggest that their patients go to other sources to find out more information. Where have your treating doctors suggested you go since your diagnosis?
Nosend	☐	My doctors have not suggested I get information from other sources since my diagnosis.

		My doctors have suggested I get information from the following sources since my diagnosis *(Check all that apply):*
sendothdoc	☐	Other doctors or health professionals
sendfam	☐	Family members, friends, coworkers
sendspat	☐	Other cancer patients
sendfacegp	☐	Face-to-face support groups
sendonlinegp	☐	On-line support groups
sendtvrad	☐	Telephone hotlines (e.g. from the American Cancer Society)
sendhotline	☐	Television or radio
sendbook	☐	Books, brochures or pamphlets
sendnews	☐	Newspapers or magazines
sendinternet	☐	Internet (other than personal email and on-line support groups)
sendoth	☐	Other

Variable name		
		Where have you actively looked for information about **<u>quality of life</u>** issues since your diagnosis? Check all that apply:
Noqual	☐	I did not actively look for information about quality of life after cancer since my diagnosis

		I have actively looked for this **<u>quality of life</u>** information since my diagnosis from the following sources *(Check all that apply):*
Qualtreatdoc	☐	My treating doctors
Qualothdoc	☐	Other doctors or health professionals
Qualfam	☐	Family members, friends, coworkers
Qualpat	☐	Other cancer patients
Qualfacegp	☐	Face-to-face support groups
Qualonlinegp	☐	On-line support groups
Qualtvrad	☐	Telephone hotlines (e.g. from the American Cancer Society)
Qualhotline	☐	Television or radio
Qualbook	☐	Books, brochures or pamphlets
Qualnews	☐	Newspapers or magazines
Qualinternet	☐	Internet (other than personal email and on-line support groups)
Qualoth	☐	Other

Variable name		
		Sometimes people find out things about their disease or its treatment even though they are **<u>not looking</u>** for information about their cancer at all. This might happen because they were having a conversation or watching television or using the Internet and just happened to

		come across it. What information have you come across about your cancer from **media sources** (television, radio, newspapers, magazines, Internet) when you were **not looking** for it since your diagnosis?
Noscanmedia	☐	I have not come across anything from media sources except when I was looking for it since my diagnosis.
		I have **come across** information from media sources about the following topics since my diagnosis *(Check all that apply):*
Scanmediatreat	☐	What treatments were the best for my cancer
Scanmediadochosp	☐	Which doctors or hospitals would be the best for me
Scanmediasideeff	☐	How to manage side effects of treatments
Scanmediaoth	☐	Other: Specify ________________________________

PART II ITEMS (4 QUESTIONS - FOR RANDOM HALF OF PARTICIPANTS ONLY)

[Instructions for participants: The following questions ask about advertisements that you may or may not have come across in the mass media (e.g. television, radio, newspapers, magazines, billboards, or the internet.]

[Programming instruction: Randomize the order of presenting each set of questions within PART II.]

[Instructions for participants: Sometimes hospitals or doctors advertise their services (radiation therapy, chemotherapy, or comprehensive treatment) for treating patients with cancer. These advertisements may appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet).
Please view the following two examples of advertisements ***concerning hospitals or doctors offering services for cancer****.]*

[Programming instruction: Show **two** randomly selected ads (one print ad and one video) of hospitals or doctors offering services for cancer from **Pool A of ads**]

Variable name	
viewad_hospdoc	Were you able to view the two advertisements?

No	0	[Programming instruction: Route to end of survey, consider incomplete]
Yes	1	[Programming instruction: Proceed to next item]

Variable name	
ad_hospdoc	Since your diagnosis, how often have you seen or heard advertisements concerning **hospitals or doctors offering services for cancer**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

[Instructions for participants: Sometimes advertisements about dealing with side effects of cancer treatment appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet). Please view the following two examples of advertisements ***concerning dealing with side effects of treatment****.]*

[Programming instruction: Show **two** randomly selected ads (one print ad and one video) about dealing with side effects of treatment from **Pool B of ads**]

Variable name	
viewad_sideeff	Were you able to view the two advertisements?

No	0	[Programming instruction: Route to end of survey, consider incomplete]
Yes	1	[Programming instruction: Proceed to next item]

Variable name	
ad_sideeff	Since your diagnosis, how often have you seen or heard advertisements concerning **dealing with treatment side effects**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

[Instructions for participants: Sometimes advertisements about treatment alternatives for your cancer appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet).

Please view the following two examples of advertisements ***concerning treatment alternatives for your cancer****.]*

[Programming instruction: Show **two** randomly selected ads (one print ad and one video) of advanced technology or alternatives for cancer treatment from **Pool C of ads**]

Variable name	
viewad_treatalt	Were you able to view the two advertisements?

No	0	[Programming instruction: Route to end of survey, consider incomplete]
Yes	1	[Programming instruction: Proceed to next item]

Variable name	
ad_treatalt	Since your diagnosis, how often have you seen or heard advertisements concerning **treatment alternatives for your cancer**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

[Instructions for participants: Sometimes advertisements about treatment for chronic diseases that are not related to cancer appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet). Please view the following two examples of advertisements ***concerning treatment for chronic diseases****.]*

[Programming instruction: Show **two** randomly selected ads (one print ad and one video) for the treatment of non-cancer related conditions from **Pool D of ads**]

Variable name	
viewad_chronicdis	Were you able to view the two advertisements?

No	0	[Programming instruction: Route to end of survey, consider incomplete]
Yes	1	[Programming instruction: Proceed to next item]

Variable name	
ad_chronicdis	Since your diagnosis, how often have you seen or heard advertisements concerning **<u>treatment for chronic diseases</u>**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

PART III ITEMS (4 QUESTIONS - FOR RANDOM HALF OF PARTICIPANTS ONLY)

[Programming instructions: Randomize the order of presenting each set of questions within PART III.]

Variable name	
noad_hospdoc	Sometimes hospitals or doctors advertise their services (radiation therapy, chemotherapy, or comprehensive treatment) for treating patients with cancer. These advertisements may appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet). Since your diagnosis, how often have you seen or heard advertisements concerning **hospitals or doctors offering services for cancer**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

Variable name	
noad_sideeff	Sometimes advertisements about dealing with side effects of cancer treatment appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet). Since your diagnosis, how often have you seen or heard advertisements concerning **<u>dealing with treatment side effects</u>**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

Variable name	
noad_treatalt	Sometimes advertisements about treatment alternatives for your cancer appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet).

	Since your diagnosis, how often have you seen or heard advertisements concerning **treatment alternatives for your cancer**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

Variable name	
noad_chronicdis	Sometimes advertisements about treatment for chronic diseases that are not related to cancer appear in the mass media (e.g., television, radio, newspapers, magazines, billboards, or the internet). Since your diagnosis, how often have you seen or heard advertisements concerning **treatment for chronic diseases**?

Never	Less than every month	About twice a month	About once a week	Almost every day
0	1	2	3	4

PART IV ITEMS [Programming instructions: Ask the following questions to ALL participants]

This series of questions asks about how often you use several media channels.

Variable name	In the past seven days, on how many days did you…	Days (0 to 7 days)
Newspaper	Read a newspaper?	___
Magazine	Read a magazine?	___
Natnewstv	Watch the national news on television?	___
Localnewstv	Watch the local news on television?	___
TVprograms	Watch television programs other than news?	___
Radio	Listen to radio talk shows or news?	___
Email	Use the Internet for email?	___
Internet	Use the Internet, other than for email?	___

People find out about health and medical issues from a variety of sources. *Please indicate how often you have done each of the following in the past 30 days*:

Variable name		**Not at all**	**Less than once per week**	**Once per week**	**Two or more times per week**
Gennewsmag	Read about health issues in newspapers or general magazines	1	2	3	4
Hlthnewsmag	Read special health or medical magazines or newsletters	1	2	3	4
Hlthtvnews	Watched special health segments of television newscasts	1	2	3	4
Hlthtvprogs	Watched television programs (other than news) which address health issues or focus on	1	2	3	4

	doctors or hospitals				
Hlthinternet	Read health information on the internet	1	2	3	4
Hlthfamfriend	Talked with family or friends about health issues	1	2	3	4

The next series of statements ask about what you know **now**, rather than what you knew when your original treatment choices were made. Indicate whether you agree or disagree.

Variable name		**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
Knowtreat	I know about possible future treatments for my cancer.	1	2	3	4	5
Knowriskrec	I know about	1	2	3	4	5

	the long term risk of my cancer coming back.					
Knowprob	I know about future health problems I might face because of my cancer.	1	2	3	4	5

This series of statements asks about whether you are confident or not about dealing with anything that might happen in the future. I am confident in my ability to…

Variable name		**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly Agree**
Effdecide	Actively participate in decisions	1	2	3	4	5

	related to my cancer.					
Effgethelp	Get help if I don’t understand something about my cancer.	1	2	3	4	5
Effaskquestion	Ask my doctors or nurses questions about my cancer.	1	2	3	4	5
Effunexp	Manage any unexpected problems related to my cancer.	1	2	3	4	5
Effemotprob	Deal with any	1	2	3	4	5

	emotional problems related to my cancer.					

Variable name	
Cancertype	Which of the following cancer types were you diagnosed with?

1	Colon
2	Lung
3	Prostate
4	Breast
5	Others: Specify ______________________

Variable name	
Gender	Please indicate your gender.
1	Male
2	Female

Variable name	
Hisp	Do you consider yourself to be Hispanic or Latino?

0	Yes
1	No

Variable name	
Race	What is your race? Check all that apply:

White	☐
Black	1. ☐
Asian	☐
American Indian or Alaska Native	☐
Native Hawaiian or other Pacific Islander	☐
Other	☐

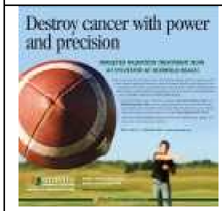
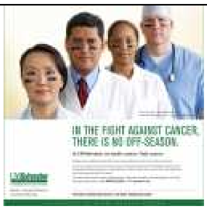
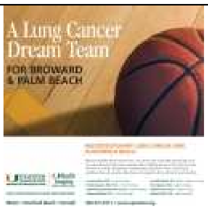
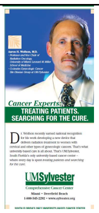
Variable name	
Educ	What is the highest grade or level of school you completed?

1	8th grade or less
2	Some high school, but did not graduate
3	High school graduate or GED
4	Some college or 2-year degree
5	4-year college graduate
6	More than 4-year college degree

[Instructions for participants: Thank you for your participation.]

Appendix B Panel of Video and Print Ads Displayed for Measure II Items (Study 1B)

1. Print ads for hospitals or doctors offering services

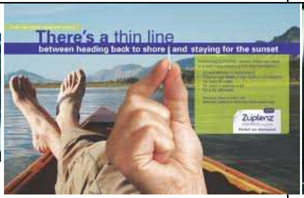
Print ad 1	Print ad 2	Print ad 3	Print ad 4
			

Note. All four print ads are from U Miami Sylvester Comprehensive Cancer Center

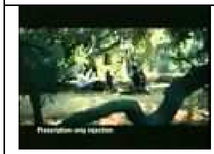
2. Video ads for hospitals or doctors offering services

Video ad 1	Video ad 2	Video ad 3	Video ad 4
 UNC Cancer Care	 Carle Cancer Center	 Hudson Valley Hospital Center	 Terrebonne General Medical Center – Mary Bird Perkins Cancer Center

3. Print ads for treatment side effects

Print ad 1	Print ad 2	Print ad 3	Print ad 4
 Zuplenz (anti-nausea)	 Aloxi (anti-nausea)	 Zuplenz (anti-nausea)	 Zometa (prevent skeletal complications)

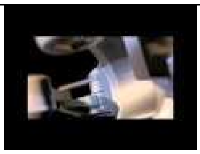
4. Video ads for treatment side effects

Video ad 1	Video ad 2	Video ad 3	Video ad 4
 Neulasta (increase immune cell count)	 Procrit (increase red blood cells)	 Procrit	 Procrit

5. Print ads for treatment alternatives

Print ad 1	Print ad 2	Print ad 3	Print ad 4
 Altoona Regional Radiosurgery	 Altoona Regional Radiosurgery	 Las Vegas Cyberknife at Summerlin	 St. Peter's University Hospital Cyberknife

6. Video ads for treatment alternatives

Video ad 1	Video ad 2	Video ad 3	Video ad 4
 Memorial Cancer Institute Cyberknife	 Fox Chase Cancer Center Minimally Invasive Surgery	 Novalis TX at St Vincent's Medical Center	 Phoenix Cyberknife

Appendix C Key Survey Measures for Study 3

1. <u>Active information seeking behaviors</u>

The questions in the next pages explore different situations.

- Sometimes you might have been **actively looking** for information about a specific cancer topic (e.g., treatment).
- Other times you might **not have been looking** for cancer information at all, but **just came across it**.

Please note what each question asks about.

When we ask what “you” did, this includes you *and* any family members or friends who may have helped you look for information.

	Did you **actively look** for information about your cancer (about treatments but also about other topics) from any sources *in the past 12 months*?
☐	I did not actively look for information about my cancer in the past 12 months.
	I did **actively look** for information about my cancer in the past 12 months from the following sources *(Check all that apply)*:
☐	My treating doctors
☐	Other doctors or health professionals
☐	Family members, friends, coworkers
☐	Other cancer patients
☐	Face-to-face support groups

☐	On-line support groups
☐	Telephone hotlines (e.g. from the American Cancer Society)
☐	Television or radio
☐	Books, brochures or pamphlets
☐	Newspapers or magazines
☐	Internet (other than personal email and on-line support groups)
☐	Other

	Sometimes people get information from other sources and discuss it with their doctors. Where have you gotten information that you **discussed with your doctors** in the *past 12 months*?
☐	I have not discussed information from another source with my doctors in the past 12 months.
	I have discussed information with my doctors in the past 12 months that I got from the following sources *(Check all that apply)*:
☐	Other doctors or health professionals
☐	Family members, friends, coworkers
☐	Other cancer patients
☐	Face-to-face support groups
☐	On-line support groups

☐	Telephone hotlines (e.g. from the American Cancer Society)
☐	Television or radio
☐	Books, brochures or pamphlets
☐	Newspapers or magazines
☐	Internet (other than personal email and on-line support groups)
☐	Other

	Sometimes doctors suggest that their patients go to other sources to find out more information. Where have your doctors suggested you go in the *past 12 months*?
☐	My doctors have not suggested I get information from other sources in the past 12 months.
	My doctors have suggested I get information from the following sources in the past 12 months *(Check all that apply):*
☐	Other doctors or health professionals
☐	Family members, friends, coworkers
☐	Other cancer patients
☐	Face-to-face support groups
☐	On-line support groups
☐	Telephone hotlines (e.g. from the American Cancer Society)

☐	Television or radio
☐	Books, brochures or pamphlets
☐	Newspapers or magazines
☐	Internet (other than personal email and on-line support groups)
☐	Other

	Where have you actively looked for information about **quality of life** issues like those mentioned in questions 21 and 22 in the *past 12 months*? Check all that apply:
☐	I did not actively look for information about quality of life after cancer in the past 12 months.
	I have actively looked for this **quality of life** in the past 12 months from *(Check all that apply):*
☐	My treating doctors
☐	Other doctors or health professionals
☐	Family members, friends, coworkers
☐	Other cancer patients
☐	Face-to-face support groups
☐	On-line support groups

☐	Telephone hotlines (e.g. from the American Cancer Society)
☐	Television or radio
☐	Books, brochures or pamphlets
☐	Newspapers or magazines
☐	Internet (other than personal email and on-line support groups)
☐	Other

2. **Integrative Model of Behavioral Prediction measures**

How likely is it that you will **actively seek** information about issues related to your cancer from a source **other than your doctor** in the next 12 months. *Please circle the number that best reflects your response.*

UNLIKELY	1	2	3	4	5	6	7	LIKELY

My **actively seek** information about issues related to my cancer from a source other than your doctor in the next 12 months would be. *Circle one number in each row.*

USELESS	1	2	3	4	5	6	7	USEFUL
UNENJOYABLE	1	2	3	4	5	6	7	ENJOYABLE
FOOLISH	1	2	3	4	5	6	7	WISE
NOT UP TO ME	1	2	3	4	5	6	7	UP TO ME

Most people who are important to me think I should **actively seek** information about issues related to my cancer from a source other than your doctor in the next 12 months.

DISAGREE	1	2	3	4	5	6	7	AGREE

Most people like me (e.g., other cancer patients) **actively seek** information about issues related to their cancer from a source other than their doctors.

DISAGREE	1	2	3	4	5	6	7	AGREE

If I really wanted to, I could **actively seek** information about issues related to my cancer from a source other than your doctor in the next 12 months.

DISAGREE	1	2	3	4	5	6	7	AGREE

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