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The Influence of Direct-to-Consumer Advertising: Who Will Talk to Their Doctor as A Result of Prescription Drug Advertisement?

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The Influence of Direct-to-Consumer Advertising: Who Will Talk to Their Doctor as A Result of Prescription Drug Advertisements?

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

by

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Abstract

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Virginia Commonwealth University, 2005

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OBJECTIVES:

To identify the types of patients who talk with their physicians as a result of Direct-to-Consumer (DTC) advertising.

METHODS:

Data were taken from a national survey, "Public Health Impact of Direct-to-Consumer Advertising of Prescription Drugs, July 2001- January 2002", conducted by researchers from Harvard Medical School. Participants (n = 3000) were interviewed by telephone. We constructed a conceptual framework consisting of outcomes (3 types of physician visits), intervention (DTC experience) and five groups of explanatory factors (health beliefs, demographics, health status, socioeconomic status and market factors). Data were analyzed with three multivariate stepwise logistic regressions. The three

dependent variables were whether an advertisement for a prescription drug had ever prompted the patient to: 1) visit to discuss prescription drug, 2) visit to discuss new condition, and 3) visit to discuss treatment change.

RESULTS:

Out of all independent variables, only six variables consistently showed significant effects on the three dependent variables after adjusting for other variables. They were: 1) taking medication on regular basis, 2) having anxiety, 3) having high advertisement attentiveness, 4) viewing media as the most important source prompting one to talk with physician, 5) believing that DTC advertisements increased awareness of new treatment, and 6) believing that DTC advertisements improved discussion with health professionals. The six variables were the strongest predictors for DTC-prompted physician visits.

CONCLUSIONS:

Our nationally representative study found multiple factors were associated with different types of physician visits prompted by DTC advertisements. This information could be used to target those patients most likely to talk to their physicians as a result of DTC advertisements.

CHAPTER 1

INTRODUCTION

In 2003, the pharmaceutical industry was estimated to spend over $3 billion on direct-to-consumer (DTC) advertising in the United States and spending on DTC advertisements quickly climbed between 1996 and 2003. (IMS, 2004; Rosenthal, 2002) Some research attributed the escalated DTC advertising expenditure to the relaxation of regulation from the Food and Drug Administration (FDA) in 1997. (Rosenthal, 2002; Kaiser, 2001; Joel, 2001;Weissman, 2003) However, it was only part of the story. Many driving forces were behind the increases in DTC advertising. Over the last two decades, great changes occurred in the U.S. health care system. These changes contributed substantially to the growth of DTC advertising.

Driving forces behind DTC advertising

In addition to FDA regulation relaxation, several forces facilitated the growth of DTC advertising in the healthcare market.

More flexible drug formularies

According to Academy of Managed Care Pharmacy (AMCP), a drug formulary is "a continually revised list of prescription medications which represent the current clinical judgment of providers in hospitals, health plans, and physician groups under contract with health plans." (AMCP, 2002) It is an essential tool utilized by managed care to control

drug costs and ensure appropriate drug therapy. With closed or single-tier formularies, the plans only cover certain drugs. If plan enrollees want to use prescription drugs not on formularies, they are required to pay out-of-pocket for the entire cost of those medications. As limited or tightly controlled drug formularies have been responsible for considerable dissatisfaction among patients and physicians, more health plans are shifting their formularies from single-tier or 2-tier to 3-tier formularies. (Briesacher, 2004) According to the Annual Employer Health Benefits Survey by Kaiser, the use of 3-tier drug plans has nearly doubled in recent years, from 29% of covered workers in 2000 to 57% in 2002. It was reported that currently no more than half of health maintenance organizations (HMOs) and only 10% of employer-sponsored health plans use closed formularies. (Carroll, 2002)

Many plans applied 3-tier formularies to loosen their restrictions and improve drug coverage by requiring patients to pay more out of pocket. In contrast to single-tier formularies which normally only cover certain drugs, 3-tier formulary systems cover a broader range of drugs, but may require patients to pay higher copays. Three tier formularies set the lowest co-payment for generic drugs, a higher co-payment for formulary or preferred brand name drugs, and the highest co-payment for non-formulary brand name drugs. (Briesacher, 2004) Consumers are informed of differential co-payments and given the option to pay more to receive drugs in higher tiers. Therefore, as formularies became less restrictive and managed care shifted more drug costs to patients, patients have become more engaged and conscious of physicians' prescribing decisions and have started to seek alternative information sources to support their medical decisions. (Hunt, 1998)

Getting health information from DTC advertisements is potentially one of the choices. (FDA, 2001)

Restrictions in promotion to physicians

Today, managed care organizations (MCOs) have brought in new policies for drug selection. These policies require that new products demonstrate either cost advantages or therapeutic advances over existing therapies. They limited physicians' ability to prescribe expensive prescription drugs through a number of mechanisms, including higher co-pays, generic substitution, and drug utilization review. (Hunt, 1998) These policies have placed pressure on drug manufacturers and made it more difficult for them to promote their products to physicians, especially those with little therapeutic advantage or those that treat "life-style" conditions, such as baldness or obesity. (Hunt, 1998) DTC advertising provides a way to stimulate demand for these products, especially when they possess milder side effects or easier dosing forms. Therefore, as formularies become more flexible in allowing patients to choose their preferred drugs, patients can help the industry break physician's static prescribing patterns by asking for new drugs directly.

Changes in the FDA regulation

Since 1962, the FDA has regulated the advertising of prescription drug products under the Federal Food, Drug, and Cosmetic Act and related regulations. In Section 502(n) of the Act, there were two key provisions on labeling and prescription drug advertising. One was "brief summary" and the other one was "fair balance". "Brief summary" meant

labeling must include "such information in brief summary relating to side effects, contraindications, and effectiveness." (FDA, 1999) In fact, the summary was not "brief". It typically required several pages. The manufacturers therefore found it extremely difficult to meet the brief summary requirement in a short television (TV) or radio advertisement. At the same time, the body of the advertisement must give "fair balance" to the benefit and risk information. That is, claims of drug benefits, such as safety and effectiveness, must be balanced with relevant disclosures of risks and limitations of efficacy. An advertisement was deemed to violation of section 502(n) if it was false, misleading or lacked "fair balance". (FDA, 1999)

In August 1997, the FDA reviewed its policies on broadcast advertisement and issued "draft guidance" to manufacturers. (Rosenthal, 2002) In this new guidance, "brief summary" can be replaced by "adequate provision" which is permitted by the FDA for "dissemination of the approved or permitted package labeling in connection with the broadcast presentation." ((21 CFR 202.1(e)(1)) In details, the radio or TV advertisements may meet the adequate provision requirement through an approach that will allow most of a potentially diverse audience to have reasonably convenient access to the advertised product's approved labeling. The approach must include the following components: a toll free phone number, a print reference to DTC advertising, an Internet address, and a statement that directs consumers to physicians or pharmacists for further information. (FDA, 1999) However, advertisements broadcast through media such as television, radio, or telephone communications systems must disclose the product's major risks in either the audio or audio and visual parts of the presentation. (FDA, 1999) Without the need to

include detailed risk information that accompanies magazine and other print advertisements, TV and radio quickly become popular promotional tools in pharmaceutical marketing.

More drugs suitable for DTC advertising

The U.S. health system has changed from primarily treating acute conditions to treating more conditions that are chronic. (Williams et al., 1999) Many chronic diseases are associated with age and are not curable. Drugs treating these diseases usually are repeatedly used over a lifetime. Some chronic conditions such as hair loss, erectile dysfunction (ER), and obesity lacked effective drug treatments before the late 1990s. Some physicians also called them “lifestyle” diseases or "non-diseases". (Joel, 2001; Smith, 2002) Since the late 1990s, the pharmaceutical industry has introduced a number of new drugs treating these diseases. Viagra for ER, Propecia for baldness, and Meridia for weight-loss were good examples. These “lifestyle” drugs became very popular in the market as consumers became more concerned with better quality of life in their healthcare. Furthermore, other new prescription drugs emerged in the market that possessed milder side effects or easier dosing forms than the comparable older drugs (NIHCM, 2002). However, these products had neither cost advantages nor therapeutic advances over existing therapies. These new drugs and the ‘life-style” drugs usually are not covered by managed care plans (Hunt, 1998). DTC advertising provides a way to stimulate demand for these products

Intensified demand for health care information

Since the 1990s, many patients have expressed desire and interest in active participation in their own healthcare. (Knapp, 2000) One of the important reasons was the decline of trust in physicians. (Hunt, 1998) Consumers gradually became aware of managed care mechanisms, such as restricted formularies and financial risk sharing by physicians, and this awareness has tended to undermine their faith in physicians as agents acting in their best interests. It led patients to seek outside information on drug therapeutic alternatives, such as DTC advertisement. (Hunt, 1998)

The benefits and risks of DTC advertising

As a drug has benefits and risks, DTC advertising not only has its benefits, but also raises concerns about misleading information. This results from the ethical dilemma of marketers who sponsor DTC advertising: as health product providers, pharmaceutical manufacturers are responsible for the optimal use of medications, however, as business units, making maximum profit and surviving in the market is their goal. This conflicts of interest may lead to biased information in DTC advertisements. (Mello et al., 2003; Mintzes et al., 2002) At the same time, if a drug has little therapeutic advantage over other products in the same class of drugs, and has an inflated price as a result of heavy DTC advertisements, the practice would lead to waste in healthcare resources. In some extreme cases, when the drug may potentially cause long-term risks to patients, the impact would be even worse. For example, in December 2004, Merck had to announce a voluntary

withdrawal of vioxx from the market because the FDA reported that patients taking Vioxx chronically face twice the risk of severe cardiovascular events compared to patients receiving a placebo. (FDA, 2004) Ironically, this drug has been one of the most advertised brands through DTC advertising since its successful launch in 1999. In 2000 alone, Merck spent over $160 million on media advertising for Vioxx. (Kaiser, 2001)

Therefore, with deeply planted conflicts of interest, DTC advertising and its impact on public health is like a double-edged sword with negative side and positive side. Deeper discussion about the two sides is necessary for a better understanding of influence of DTC advertising on patients' health behaviors.

Benefits of DTC advertising

Increase in awareness of under-diagnosed and untreated diseases

The FDA and the government agencies are concerned with untreated and under-treated disease among the population. The National Institute of Health (NIH) guidelines stated that for every 100 patients who should be treated with drug therapy for high cholesterol, currently only 25 patients are under treatment. (NIH, 2001) The Centers for Disease Control and Prevention (CDC) also reported that 25% of all working-age people with high blood pressure did not even know they have it. (CDC, 2001) As a result of these concerns, the FDA (FDA, 2002) expected DTC advertising to help educate patients to some extent and make them recognize the symptoms and harms of diseases.

Surveys have shown DTC advertising does alert consumers to the existence of diseases and leads patients to search for more information. (FDA, 1999 & 2002; NCL,

1998; Prevention, 1998, 1999 & 2001; Kaiser, 2001) Among surveyed consumers, 67% agreed that advertisements increased their knowledge about disease. (NCL, 1998) However, to what extent patients gained knowledge from advertisements was still in question. Kaiser found that after seeing an advertisement, 70% of survey consumers knew little or nothing more about the health condition for which the drug was indicated. (Kaiser, 2001) Some patients, therefore, sought more sources of drug information after seeing drug advertisements. FDA surveys revealed that 43% to 53% of patients searched for further information through such sources as the Internet, newspapers, and friends. (FDA, 1999 & 2002)

Increase in awareness of drug treatment

A number of surveys (FDA, 1999, 2002; NCL, 1998; Prevention, 1998, 1999 & 2001; Kaiser, 2001) indicated that DTC advertising enhances treatment awareness. This is understandable since the basic function of DTC advertising is to offer education on prescription drugs. With DTC advertisements, patients have more chances to know available treatments for their diseases and to be prompted to discuss the new treatments with their physicians. It potentially increases patients' accessibility to therapeutic alternatives. Roth (Roth, 1996) classified DTC advertisements' contribution to treatment awareness into five categories. The first one was new therapies used to treat conditions that were formerly untreatable or poorly treated, such as erectile dysfunction or Alzheimer's disease. The second was drugs for conditions that tend to be under-diagnosed and under-treated, even though drug therapies were available, for example, hypertension or high-

cholesterol. The third category was drugs that lower risks or have milder side effects, and so expand the number of patients who can tolerate drug treatment. The fourth was brand products that have cheaper, generic or over-the-counter (OTC) equivalents. The last category is products with little benefit but that are safe and easy for physicians to prescribe. According to this study, DTC advertisements for the first three categories offer patients better therapeutic options. Advertisements for the last two lead to higher drug costs.

Enhance patients' involvement in their own healthcare

Major national surveys also indicate that about one fourth of patients were prompted by DTC advertisements to discuss with their physicians advertised treatments that were related to their health. (FDA, 1999, 2002; Prevention, 1998, 1999 & 2001; NCL, 2002; Kaiser, 2001) Most patients (74% to 76%) agreed that DTC advertisements allowed them to be more involved in their health care. (Prevention, 1998 & 1999) The involvement includes searching for related health information; increased physician visits, better discussion with physician about health conditions or new treatments, and improved compliance with the advertised medication. Physicians felt comfortable about patients playing an active role in their healthcare, and they would like to see this involvement. (FDA, 2002) Patients' compliance to medications also showed some improvement as a result of DTC advertising. In the Prevention study, approximately one-fourth of the respondents reported that DTC advertisements reminded them to refill their prescriptions (Prevention, 2001). A FDA study reported a lower rate, 10%. (FDA, 1999) A case-control study by Pfizer also indicated that patients who took the advertised drugs that they

requested from physicians are significantly more likely to refill their prescriptions than those who did not initiate a request. (Pfizer, 2001)

Concerns about DTC advertising

Misleading or deceptive information

According to 21 CFR.202.1 (FDA), misleading or deceptive information in DTC advertising includes 1) misrepresenting or falsely reporting data, 2) declaring superiority without scientific data to support the claim, 3) suggesting the drug is better than another before it is proven, and 4) representing "off-label" use (new indications that are not approved by the FDA). (FDA, 2004)

However, pharmaceutical manufacturers continue to deliver misleading information to consumers in DTC advertisements. Between August 1997 and August 2002, the FDA issued 88 regulatory letters and four warning letters for DTC advertisements that violated its regulations. Among the letters, there were 14 letters to GlaxoSmithKline, six letters to Schering Corporation, and five letters to Merck & Co. Inc., all about their misleading advertisements. (GAO, 2002) It was reported that half of the regulatory letters issued by the FDA in 2001 had cited advertisements that made misleading claims about a drug's efficacy. For example, in August 2001, the FDA sent a warning letter to the distributors of Luxiq cream, a dermatological product, for falsely reported data. Its advertisement claimed that the product was "highly effective for three out of four patients", even though the clinical study cited in the labeling had found that the cream improved various symptoms for 41% to 67% of patients, or no more than two in three. (GAO, 2002)

Unbalanced information on benefit and risk

Researchers have indicated that many advertisements tend to allot more space to the positive features or drug benefits, while minimizing information about risk and adverse effects (Mello, 2003; Mintzes et al., 2002). The FDA's Division of Drug Marketing, Advertising and Communication (DDMAC) raised complaints about the lack of risk information in DTC advertisements (Smith, 1998). These complaints included: 1) lack of reference to risks, adverse effects, and side effects; 2) not presenting risk information in a prominent and readable manner; 3) using confusing language and technical terms that are often misunderstood by the general public; 4) showing claims of safety not substantiated by well-controlled studies; and 5) not providing balance between risk and efficacy, e.g. small type for the risks and large type for efficacy. However, unbalanced information may be inherent in advertisements, because the purpose of advertisements is to promote products rather than to deter patients from using them.

Increase unnecessary physician visits and inappropriate drug prescribing

Some experts pointed out that brand-specific requests by patients may lead to inappropriate drug prescribing because patients may not be able to correctly self-diagnosis their disorders or symptoms. (Lexchin, 2002) In the opinions of researchers, patients usually lack sufficient knowledge to self-diagnose. Therefore, it is unlikely that patients' brand-specific requests are necessary or correct. Researchers also found that physicians are more likely to become irritated from patient queries originating from DTC advertisements

rather than other sources of information. (Zachry, et al, 2003) Surveys of physicians and patients in primary care settings also showed a strong association between a physician's decision to prescribe and their perceptions of patient desire for a prescription even when they know the drugs are not indicated. (Himmel et al., 1997; Schwartz, et al, 1989) Therefore, if patients pressure physicians into prescribing the advertised drugs, the practice may lead to inappropriate prescribing behavior. Interestingly, another study indicated that, despite concerns about DTC advertisements' negative consequences, there were no differences in health effects between patients who took requested advertised drugs and those who took other prescription drugs. (Weissman, 2003)

Increase in drug costs

Both the public and the pharmaceutical industry are highly concerned about costs. From the public side, most brand-name drugs promoted in DTC advertisements have higher prices than their therapeutic alternatives, especially their generic alternatives. If the brand-name drugs were new therapies used to treat formerly untreatable or under-treated conditions, or if they had lower risks or milder side effects, they would be better choices in clinical practice. In this case, the advertised drugs' higher prices would be acceptable. The news drugs, regardless of the level of improvement, have cost industry billions of dollars in research and development (R&D). Their R&D costs need to be recovered. This may require spending even more money on promotion in hopes of gaining enough profit from the market to support further research investments. The costs will be shifted to consumers through inflated prices on drugs. Driven by cost considerations, Managed Care

Organizations (MCOs) have implemented new policies to limit the use of drugs with no cost advantages or therapeutic advantages over existing therapies. This forced drug companies to spend more money on DTC advertisements to promote these products. (Hunt, 1998) As a result of heavy expenditures on marketing, it was reported that in 2000 the average price of advertised new drugs was nearly twice the average price of existing drugs prescribed for the same indications. (Dana, 2003)

Return-on-investment (ROI) studies on DTC advertising

After investing billions of dollars in promotional expenditures, the pharmaceutical industry has great concerns about the value and cost-effectiveness of DTC advertising. Neslin's return on investment (ROI) research indicated that, compared with other marketing promotion tactics, such as detailing, drug sampling, and medical journal advertisements, DTC advertising was not cost-effective. Neslin used a total of 391 marketed prescription drugs' data provided by Scott-Levin and PERQ/HCL from 1995 to 1999. In the study, ROI was defined as the increase in revenue for each dollar invested in DTC advertising. Neslin found that for each additional dollar spent on promotion, the ROI was $1.72 for detailing, $5.00 for journal advertising, $3.56 for physician meetings and events, but only $0.19 for DTC advertising. (Neslin, 2001)

Why was DTC advertising less effective? There are two potential answers. First, DTC advertisements are not targeted. While DTC advertisements can focus promotion to some extent, the percentage of the audience relevant for the content is still low. Second, the

period of study 1995-1999 was probably a period of learning about DTC advertising. Pharmaceutical companies were still investigating which types of advertisements were most effective. In addition, the regulations allowing DTC advertisements on TV and radio were not implemented until 1997.

A follow-up study conducted by Wittink looked at additional data through the year 2000. The outcome was still not favorable for DTC advertising. Compared with other marketing tactics, DTC advertising had the lowest ROIs in every brand revenue category. Many of the brands reported low or negative ROIs. The study also analyzed three therapeutic categories: arthritis, asthma, and hypertension. Results showed DTC advertising had the lowest ROIs (only $ 0.1) in each of the therapeutic classes as well. (Wittink, 2002)

Kaiser's study in 2003 suggested that DTC advertising had a positive ROI for five therapeutic drug classes. (Kaiser, 2003) The five therapeutic classes were antidepressants, cholesterol lowering, proton pump inhibitors, nasal sprays, and antihistamines. It was reported that increases in DTC advertising were associated with significant growth in drug sales. For every 10% increase in DTC advertising, total drug sales increased on average by 1%. Each additional dollar spent on DTC advertising in 2000 yielded $4.20 in additional pharmaceutical sales that year for the 5 therapeutic drug classes.

In 2004, three years after Neslin's study, IMS researchers conducted a new ROI analysis. This study examined 49 brands between 1998 and 2003. DTC advertising's carry-over effect and lifetime value were considered in the new model. The carry-over effect was a delayed response to DTC advertising. The concept of lifetime value was that once a

patient filled a new prescription attributable to DTC advertising, all the patients' refills should be counted into the ROI of DTC advertising. IMS researchers found that when averaged across the entire database, new prescriptions generated by DTC advertising only accounted for about 20% of total DTC advertising contribution. Therefore, in most cases, whether or not the carry-over effect and lifetime value were considered made the difference between positive and negative ROIs. The IMS study also found that 90% of the brands showed positive ROIs, 70% had over ROIs of over $1.5 ROI, and 35% had ROIs of over $2.5 . (IMS, 2004)

Though DTC advertising showed better ROIs in recent years, the studies conducted by Kaiser and IMS failed to compare DTC advertising's ROI directly with other marketing tools. Hence, there was no evidence that DTC advertising is more effective than the other common forms of marketing promotion. The IMS study also indicated that brands with sales below $200 million resulted in low or negative ROIs, which was consistent with Neslin's study ($0.59 ROIs for DTC advertising). At this sales level, detailing had a ROI of $3.70 and journal advertising had an ROI of $4.47. In other sales levels, DTC advertising also showed lower ROIs. It showed that even when DTC advertising's carry-over effect and lifetime value were considered for study, DTC advertising was the least effective among promotional tactics.

Statement of Problem

Studies on ROI indicated that the outcomes of DTC advertising showed no advantages over alternative promotional tactics. One of the most important reasons may be that DTC advertisements were not efficiently targeted to consumers. (Neslin, 2001) From pharmaceutical marketing prospective, further studies should examine the characteristics of patients who were interested in the DTC advertisements, offering a basis to investigate the types of patients who should be targeted with DTC advertisements.

Thus, the purpose of this study was to identify the types of patients who will visit their physicians as a result of prescription drug advertisement. Two questions are addressed in this study:

The first question is whether patients with different individual characteristics (such as health status, gender, or race) are more likely to visit their physician as a result of seeing a DTC advertisement for prescription drugs (DTC-prompted visits). The second question is whether patients' health beliefs about DTC advertising are associated with their DTC-prompted visits. Individual characteristics in this study consist of four groups of factors, including personal health status and healthcare utilization, demographics, socioeconomics, and market factors. These factors will be explained in Chapter 3. In terms of the DTC-prompted visits, there are three types of visit experience. The first one is the experience of talking with physicians about a prescription drug for themselves. The second type is the experience of talking with physician about a medical condition, illness or other health concern of their own that patients had not discussed with physicians before. The third one is the experience of talking with physicians about possible change in treatment for a

medical condition or illness that patients already had. Once the factors that interact with DTC advertising to influence patients' physician visiting behavior are determined, marketers can use the information to target consumer groups more efficiently.

Hypotheses

According to the two questions to be answered in this study, six hypotheses were framed:

H1: There is a statistically significant relationship between patients' individual characteristics and whether or not they will talk with their physician about a prescription drug after being prompted by a direct to consumer prescription drug advertisement.

H2: There is a statistically significant relationship between patients' personal health beliefs and whether or not they will talk with their physician about a prescription drug after being prompted by a direct-to-consumer prescription drug advertisement

H3: There is a statistically significant relationship between patients' individual characteristics and whether or not they will talk with their physician about a new health concern after being prompted by a direct-to-consumer prescription drug advertisement

H4: There is a statistically significant relationship between patients' personal health beliefs and whether or not they will talk with their physician about a new health concern after being prompted by a direct-to-consumer prescription drug advertisement

H5: There is a statistically significant relationship between patients' individual characteristics and whether or not they will talk with their physician about change in treatment after being prompted by a direct-to-consumer prescription drug advertisement

H6: There is a statistically significant relationship between patients' personal health beliefs and whether or not they will talk with their physician about change in treatment after being prompted by a direct-to-consumer prescription drug advertisement

Implications in practice

Findings from this study will help pharmaceutical marketers evaluate the influence of DTC advertising on physician visits in different consumer groups. The major national surveys have told us DTC advertising did influence consumers to some extent. These surveys reported that 70% to 99% of consumers were aware of DTC advertisements. 18% to 31% of consumers discussed advertised drugs with their physicians; and 6% to 9% of consumers requested advertised drugs from their physicians. (FDA, 1999 & 2002; NCL, 1998; Prevention, 1998, 1999 & 2001; Kaiser, 2001) However, DTC advertising's influence on physician visits among different patient groups, such as elderly patients,

African-Americans, patients without prescription drug coverage and patients with different health beliefs, were not examined in these national surveys. Several local studies covered some of these issues based on their interests on patients' attitude, value, and actual request behaviors, but none of them has answered the questions with nationally generalizable results.

Our study used nationally representative data to examine patients' action in response to DTC advertisements. Based on the findings, marketers could identify the patients most likely to visit physicians as a result of DTC advertising, therefore, they could target consumers more efficiently. The marketers can use the study outcomes to develop customized messages and interactive tactics. Rather than the traditional media advertising on TV or radio, which just delivers messages to the audience without targeting individual differences, these customized messages and new technologies can make it easier to stimulate demand according to the characteristics of each individual. For example, using some direct response technologies on the Internet, marketers can send customized letters and brochures to those most likely to switch to new treatments based on the answers that respondents give to questions about their experience with a disease state or personal beliefs. At the same time, emails could be sent to them to direct them to a web site with information most relevant to their needs, such as the disease and new treatment knowledge. This would be more effective than simply directing them to a home page where they have to search for what they want. Therefore, as a result of more effective targeting based on consumer differences, the industry could improve their return-on-investment ratio for DTC advertising over time.

CHPATER 2

LITERATURE REVIEW

The overview of the DTC advertising ROI studies told us that DTC advertising was less effective than other marketing tools. One possible reason may be that DTC advertising has not targeted patients efficiently. (Neslin, 2001) To solve this problem, further studies need to examine those patients who are interested in the advertisements and identify those who are most likely respond to DTC advertisements. So far, only a limited number of studies have identified factors influencing patients' attitude and behavior toward DTC advertising.

Factors influencing patients' attitudes toward DTC advertising

A study from University of Rochester has explored what kind of patients would value the information provided by prescription drug advertisements using a Scott-Levin data set. This study reported that consumers with children or chronic diseases value prescription drug advertising more highly, while older consumers, recently sick patients, and more educated consumers are more likely to value their physician's opinions instead. (Gonul et al., 2000)

A study by Doucette et al. looked at the effects of age and medication knowledge on the public's desire for additional drug information following DTC advertising exposure. (Doucette et al., 1998) This was a mail survey with a random sample of 150 respondents.

They found that older and less knowledgeable people were less likely to report a desire to seek additional information, such as talking to a physician, after exposure to a DTC advertisement. Among the information sources (i.e. physicians, pharmacists, a family member or friends), physicians were the most strongly preferred for information on drug benefit and risk. The knowledge levels in this study were reported by respondents only, and may have been inaccurate.

Based on the results of a survey conducted by Prevention magazine, Sumpradit explored consumers' attitudes towards DTC advertising. (Sumpradit et al., 2002) The study indicated that consumers who have ever asked their physicians for advertised prescriptions tended to agree that DTC advertisements made prescription drugs appear harmless and helped them make their own decisions on prescriptions.

Factors influencing consumers' responses to DTC advertising

In 1999, the FDA carried out a survey on DTC advertising, as part of an evaluation of the impact of the 1997 draft guidance on broadcast advertising. (FDA, 1999) In order to improve the report's accuracy, the study included 960 (90%) people who had seen their physician within the past three months and 121 (10%) people who had seen their physician more than 3 months previously. The FDA found a significant difference in response to advertising between the two groups. Only 8% in the former group reported bringing up a new health condition because of advertising, versus 27% for the later group ($p < 0.001$). Each group had the same proportion of people covered by health insurance. Those who had

seen a physician recently reported greater awareness of DTC advertising and significantly poorer health status than those who had not. This survey confirmed the results of other major surveys indicating that most consumers report positive responses to DTC advertising. However, except for heath care utilization (defined as a physician visit), the study did not examine other factors relating to people's responses to advertising.

Kaiser conducted a case controlled survey on DTC advertising in 2001. (Kaiser, 2001) Researchers used a new, internet-based survey technology to show respondents (viewer group) a particular drug advertisement and then asked them questions related to the advertisement. They also included a "non-viewer" group of respondents who did not view an advertisement and asked them similar questions. There were a total of 1,872 viewers and 639 non-viewers. Those with the greatest health needs, the elderly, and those who reported that they are in fair or poor health were found to be more likely to report that they talked to their physician about advertised drugs, though not more likely to receive a prescription for the advertised drugs. For example, 39% of those aged 65 or older and 41% of those with fair or poor health reported the experience of talking with a physician about advertised drugs as a result of seeing a drug advertisement (compared to 30% of the sample overall). In response to specific advertisements showed to them, those who have a relevant medical condition were more likely to anticipate that they would talk to their physician about the medicine. Significance levels on the differences were not stated in the results.

Sumpradit also explored how consumers' characteristics interacted with DTC advertising to influence patient behaviors, such as asking for advertised prescriptions. This

study used a subset of 1,102 consumers who responded to a 1998 national survey conducted by Prevention magazine The findings indicated that consumers with chronic conditions and positive attitudes toward DTC advertising were more likely to have the experience of talking with physicians about the advertised drugs. (Sumpradit et al., 2002)

Peyrot et al. examined the effects of demographic factors, media exposure, attitude and prescription drug knowledge on requests for advertised drugs. (Peyrot et al., 1998) They carried out a random digit dialed (RDD) survey of 440 residents in Baltimore. The study showed that the belief that drug advertising reduces prices, preference for generic drugs, media exposure and drug advertising awareness were positively associated with drug requests, but the belief that physicians should be the sole source of drug information was negatively associated with the probability of request. The authors described the effects of different media exposure (i.e. print media exposure, television exposure) on patients' responses to drug advertising, but in the published article, they did not clearly explain the concept of media exposure. Measurements for media exposure were also not described in detail by the authors. Rather than measuring the amount of awareness, this study simply measured drug advertising awareness with "whether awareness exists", that is, respondents were asked whether they were aware of drug advertising or not. It was also one of the limitations pointed out by authors that "more comprehensive and in-depth measures of drug advertising awareness" should be developed. (Peyrot et al., 1998) Univariate analyses found that women were more likely to request an advertised drug than men; whites than non-nonwhites; and professionals and better educated than those with less education. However, when the model was adjusted for attitudes and media exposure, no

statistically significant differences were found for race, gender and education. No relationship was found between age and requests for advertised drugs. The research did not include information on insurance coverage and health care utilization. The time of the study was in 1990, well before the changes to FDA regulations on DTC advertising in 1997. Exposure to DTC advertising was therefore much lower than it would currently be. All survey respondents were residents of central Baltimore. This limits the generalizability of the study.

In a survey of primary care physicians in Sacramento, California, and Vancouver, British Columbia, researchers analyzed the association between advertising exposure and patients' requests for advertised drugs. (Mintzes et al., 2003) A total of 78 physicians (Sacramento n = 38, Vancouver n = 40) and 1431 adult patients (Sacramento n = 683, Vancouver n = 748) were selected for study. Physicians were requested to complete a questionnaire about a patient immediately following the patient visits. In this research, they measured advertising exposure as the number of listed drugs a person had seen advertised. Researchers found patients with higher exposure to DTC advertising, patients who had conditions that were potentially treatable by advertised drugs, and those with greater reliance on advertising requested more advertised drugs. They used models controlling self-reported health status, use of healthcare service, health information source, age, sex, household income, and drug insurance coverage. Information on the significance of these factors was not reported in the study. This research was limited in that only respondents from two cities were surveyed, and one of the cities was in Canada where the healthcare system is substantially different from the U.S. healthcare system.

Summary of literature

A review of the literature showed that several factors have an impact on patients' attitudes towards DTC advertising. Specifically, patients with children, chronic disease conditions (Gonul et al., 2000), less knowledge (Doucette et al., 1998), or former experience of asking for advertised drugs have positive attitudes towards DTC advertising (Sumpradit et al., 2002). While older, recently sick patients, or more educated consumers preferred physicians' opinions rather than drug advertisements as sources of drug information (Gonul et al., 2000).

Studies also indicated that some factors can influence patient's behavior of asking for advertised drugs. Multiple factors were found positively associated with drug request prompted by DTC advertising: the belief that drug advertising reduced prices, preference for generics, media exposure (including DTC advertisements), drug advertising awareness, conditions potentially treatable by advertised drugs, and reliance on advertisements. (Peyrot et al., 1998; Mintzes et al., 2003). Patients who have seen their physicians recently (FDA, 1999), patients with the greatest health needs, elderly patients, those in fair or poor health (Kaiser, 2001), those with chronic conditions and positive attitudes toward DTC advertising (Sumpradit et al., 2002) were more likely to talk to their physicians about advertised drugs.

Although there were a number of national surveys, most of them were descriptive studies, and did not statistically analyze the relationship between patients' response to DTC advertising and factors, such as demographics, health status, and exposure to

advertising, which may potentially influence patient's behavior. Several studies conducted in more limited geographic areas examined the factors influencing patients' attitudes or behaviors in response to DTC advertising. Because of limitations in sample size, location, or differences in nationality and healthcare system, few of them were generalizable to larger populations in America. Several studies have explored one type of physician visit, like talking to physician about advertised drug or request for advertised drugs directly, however, no single study has looked at the factors associated with different types of DTC-prompted visits.

To enhance the understanding of DTC advertising's influence on human health behavior, our research examined three types of DTC-prompted visits. The first type of visit was talking with physicians about a prescription drug for themselves. The second type was talking with physicians about a new medical condition. The third one was talking with physicians about switch to new treatment. Examining all three types of visits constructed a more complete picture of the effects of DTC advertising on patient's interactions with their physicians. Furthermore, our study of factors that are associated with patient's DTC-prompted visits were based on nationally representative data.

Conceptual framework

We developed a conceptual framework to explore how patients' characteristics interact with DTC advertising to influence their physician visits. There is little theoretical guidance in the literature with respect to the structure of a model predicting patients' DTC-

prompted visits. However, the problem is not complex if we build the conceptual framework based on related theories and literature. The major constructs for our conceptual model were selected from two behavioral theories.

The Theory of Reasoned Action

The Theory of Reasoned Action, as a general theory of human behavior, was introduced by Fishbein and was further developed and tested by Fishbein and Ajzen. (Fishbein et al., 1980) The theory attempts to explain the relationship among beliefs, attitudes, intentions and behavior. It is based on the assumption that human beings are usually quite rational and their behaviors are under volitional control. The theory views a person's intent to perform or to not perform a behavior as the intermediate determinant of the action. Individuals will intend to perform a behavior when they are motivated by their attitude and subjective norms. (Fishbein et al., 1980) That is, the behavior is more likely to be performed when they have positive attitude about the behavior and when they have positive normative belief, believing that important others (referents) think they should perform it. Instead of predicting patients' intention to visit a physician as a result of DTC advertising, we used attitude and subjective norms to predict their behavior directly.

The Theory of Reasoned Action has been applied extensively in the health field to predict several health behaviors, such as smoking and exercise. (Kaplan et al., 1993) Recently, some mass media campaigns have successfully applied the theory in health promotion. (Randolph et al., 2004) These campaigns tried to focus marketing efforts on the factors and determinants that could potentially change consumer's health behavior. For

instance, norms about alcohol consumption were successfully changed by a campaign to discourage binge drinking on college campuses. (Thombs et al., 2002) Oh and his colleagues also based their campaigns on the Theory of Reasoned Action to promote awareness of risks and screening for chlamydia, and proved to be successful. (Oh et al., 2002)

In this study, we attempted to apply the Theory of Reasoned Action to patient's DTC-prompted visits. When patients visit their physicians as a result of DTC advertisings, they are assumed to be under volitional control rather than being controlled by emotions. There are several potential reasons. First, patients are usually serious about their diseases and treatments. (Hunt, 1998) Second, they value the recommendations from the sources (referents) that they usually receive healthcare information from, such as physicians, friends or TV advertisements; (Gonul et al., 2000) Third, when they initiate a discussion or request for advertised drugs during the visits, patients usually have knowledge about the disease and the new treatment. (FDA, 2002) A physician survey on DTC advertising has reported that when a patient asks about a drug, 88% of the time they had the condition that the drug treated, and 80% of physicians believed patients understood what condition the drug treats. (FDA, 2002) Therefore, the Theory of Reasoned Action can be applied to predict patient's DTC-prompted visit.

Since the database used in this study lacked information on patients' attitudes toward DTC advertising, subjective norm was the only variable adopted from the Theory of Reasoned Action. According to the theory, the potential referents or sources for healthcare information could be family and friends, pharmacists, physicians, television or

radio, and advertisements on TV and other media. We tested the relationship between patient's behavior of being prompted to visit their physician and using advertising information as their subjective norms. For example, if DTC advertisement is a patient's most important information resource for healthcare, then he or she should be more likely to talk to their physician about advertised drugs and request switches to new treatments.

The Health Belief Model (HBM)

The Health Belief Model was developed in the 1950s to explain and predict individuals' inaction or noncompliance to a certain interventional behavior. (Rosenstock, 1988) It was the oldest and most widely used model specifically developed to explain health behavior. (Kaplan et al., 1993) The HBM proposes that behavior depends on how much a person values a particular goal and on his or her judgment that a particular action will achieve that goal. If the goal is to avoid a health problem, the person must feel vulnerable (perceived susceptibility) to a problem perceived to be potentially serious (perceived severity), and he or she must estimate that specific action will be beneficial in reducing the health threat (perceived benefit) and will not involve overcoming obstacles (perceived barriers). (Champion, 1984) Therefore, the model includes four principal components: perceived susceptibility, perceived severity, perceived barriers and perceived benefits. (Rosenstock, 1988) The theory has been applied to several areas of healthcare including preventive health behavior, adherence to medical regimens, sick-role behavior, and health promotion behavior. (Kaplan et al., 1993)

From pharmaceutical marketing's point of view, the goal of DTC advertising is to educate patients about the existence and severity of diseases, make them understand the benefit of advertised treatments, and finally prompt them to ask the physician to prescribe the advertised drugs. DTC advertising therefore could be looked on as an educational intervention for promoting patients to visit physicians.Limitations of the two theories

Limitations on the Two Theories

The Theory of Reasoned Action and Health Belief Model both are psychosocial models. They account for only as much of the variance in health behaviors as can be explained by attitudes and beliefs that are obvious to and consciously evaluated by individuals. (Ogden, 2003) Other factors related to the individual, such as demographic variables, health status and health utilization factors, socioeconomic factors, and market factors, may play a role in influencing behavior, but they are not included in the two models. It is the case that due to outside factors a person may not be able to perform a behavior despite a strong desire to do so.

To address this gap, our study also incorporated external factors, including personal health status, demographics, socioeconomics and market influence into the models to test their influence on the outcomes. The conceptual framework of the relationship between explanatory factors, intervention, and outcomes can be drawn as a flow chart. (See Figure 2.)

CHAPTER 3

METHODS

In this chapter, we will describe the source of data used in the study, define the variables in operational terms, and discuss statistical procedures that were employed for the analysis. In chapter 2, based on the Theory of Reasoned Action and the Health Belief Model, we constructed a conceptual framework consisting of outcomes, intervention and five groups of explanatory factors. The outcomes included talking to a physician about a prescription drug, talking to a physician about a new health condition, and talking to a physician about a possible change in treatment. The intervention was whether a patient had ever seen or heard an advertisement for a prescription drug in the past 12 months. The explanatory factors were personal beliefs, socioeconomics, demographics, health status, and market factors. Chapter 3 will operationalize the conceptual framework for predicting or explaining patients' physician visit experiences as a result of DTC advertisements.

Data source

This study used data from a national survey, "Public Health Impact of Direct-to-Consumer Advertising of Prescription Drugs, July 2001- January 2002: [United States]" (Weissman, 2003). The data set was available from the website of Inter-university Consortium for Political and Social Research (ICPSR). A detailed description of the survey design and procedure can be found at the ICPSR website. A team of researchers from

Harvard Medical School and Harris Interactive designed the survey. Professionals from Harris Interactive collected the data. A 20-minute telephone interview was conducted with a nationally representative sample of 3000 adults between July 5, 2001 and January 16, 2002 (Weissman, 2003). The unit of analysis was adults aged 18 and older living in the continental United States and having telephones. The questionnaire included 179 questions focusing on five categories:

The first category was health status and utilization. Respondents were asked about their overall health, the estimated time since their last physician visit, whether they were currently taking any prescription drugs, from what sources and how often they received medical information, and which health information resource was most important to the respondents.

The second category was experience with DTC advertising, including questions on the media in which they had seen drug advertisements, whether their friends had mentioned advertisements to them, and whether the advertisements had provided useful information.

The third category was visits to physicians to discuss information. Respondents were questioned on whether advertisements had ever prompted them to talk to their physicians about a prescription drug, a new health condition, or a possible change in treatment for an ongoing concern.

The fourth category was outcomes of visit, such as whether the drug prescribed by their physician was the same drug they had seen in advertisement, did they fill or take the

prescription that their physician prescribed, and their satisfaction with the drug's performance if they filled the prescription.

The last category included background information: gender, age, race, marital status, insurance coverage for prescription drugs, education, employment status, and income.

Sample design

The sample was selected through computerized random digit dialing (RDD). RDD ensured that the sample included not only those persons whose telephone numbers were listed in telephone directories but also those whose numbers were not listed (Weissman, 2003). The researchers used a stratified sampling process. This sample design based the number of persons in each stratum of the sample on the proportion of the stratum in the total population (Babbie, 1990). It ensured proper representation of enrollees in different regions of America. The adjusted response rate was 58 percent. The survey data were weighted by age, race, education, health insurance status (insured or uninsured), household size and gender to reflect the demographic composition of U.S. population. This sample was demographically similar to the U.S. population as described in the March 2001 Current Population Survey from the U.S. Census Bureau (Weissman, 2003).

Survey Procedures

A computer-assisted telephone interviewing system (CATI) was used for on-line data entry and editing of telephone interviews. The interview process was flexible. It varied depending on whether a respondent had seen or heard a DTC advertisement, talked to a physician about information presented in a DTC advertisement, and based on the outcomes of the discussion (receiving a prescription, filling the prescription and taking the drug as prescribed). For example, if a participant had not seen any advertisements or been told about an advertisement by a friend or a relative, no question was asked about physician visits or visit outcomes. Instead, CATI would skip to the next relevant question (Weissman, 2003). A number of methods were used to maximize the response rate. A $10 incentive was offered for completion of the interview. Two dollars were mailed to nonrespondents as an additional incentive. Nonrespondents were also sent a letter explaining the purpose of the survey and encouraging them to participate. Attempts were made to contact nonrespondents at various times of the day and days of the week. Researchers also set up a toll-free number that respondents could call to complete the survey at a convenient time (Weissman, 2003).

Variables in conceptual framework

Dependent variables

The conceptual framework specified three outcome variables as a result of DTC advertising: visit for prescription drug, visit for new condition, and visit for treatment

change. Only those who had seen or heard an advertisement for a prescription drug in the past 12 months were asked about their physician visits. Rather than using a single dependent variable, we used three dependent variables to measure DTC-prompted visits. One of the advantages was that it offered a comprehensive overview of physician visits for different purposes. Another advantage was that it helped identify the strongest predictors of DTC-prompted visits. For instance, if a factor or an independent variable was found to be related to all three dependent variables, it was probably a strong predictor of DTC-prompted visit. In contrast, if a factor or an independent variable only showed significant association with one dependent variable, it was probably a weaker predictor than the former one.

Visit for prescription drug:

Visit for prescription drug was defined as whether an advertisement for a prescription drug ever prompted the respondent to talk to a physician about a prescription drug for themselves. If the person responded “yes”, the variable “visit for prescription drug ” was given a value of one. If the answer was “no”, then the variable was given a value of zero.

Visit for new condition:

Visit for new condition was defined as whether an advertisement for a prescription drug ever prompted a respondent to talk to a physician about a medical condition, illness, or other health concern of their own that they had not discussed with a physician before. If

the person responded “yes”, the variable “visit for new condition” was given a value of one. If the answer was “no”, then it was given a value of zero.

Visit for treatment change:

Visit for treat change was defined as whether an advertisement for a prescription drug ever prompted the respondent to talk to a physician about a possible change in treatment for a medical condition or illness that he or she already had. If the person responded “yes”, the variable “visit for treatment change” was given a value of one. If the answer was “no”, then it was given a value of zero.

Independent variables

The independent variables were grouped into five factors: personal beliefs, demographics, socioeconomics, health status, and market factors.

Personal beliefs

The personal beliefs consisted of variables identified from the two behavioral theories. Variables from four subgroups were included in the personal belief factor. They were subjective norm (two variables: source importance and source utilization), perceived benefit (two variables: awareness of treatments and patient-physician communication), perceived barrier (two variables: unbalanced information in DTC advertisements and

physician's authority), and perceived severity (self-reported overall health). The following questions were used to measure respondents' personal beliefs.

Subjective norm

Source utilization**:** "How often do you get information about health from?" (TV/radio, internet, newspapers or magazines, family and friends, a pharmacist, pamphlets in a physician's office, or a physician) (Weissman, 2003)

Respondents were asked about their utilization of each source of information: television or radio (not including advertisements), Internet websites, newspapers or magazines (not including advertisements), family and friends, a pharmacist, pamphlets in a physician's office or waiting room, and physicians. Responses for the utilization of each source were measured with: 1 = never, 2 = hardly ever, 3 = sometimes, and 4 = often.

Referent source**: "**Which one of the sources was the most important in prompting you to talk to your physician?" (Weissman, 2003)

For this question, we classified the above sources/referents into two categories: media source or non-media source. Media sources included television or radio, Internet websites, newspaper or magazine, pamphlets and advertisements for prescription drug. The remaining sources were defined as non-media sources. If a person chose a media source, the variable "referent source" was given a value of one. If the choice was non-media source, then variable was given a value of zero.

Perceived benefit

Awareness of treatments: "(DTC advertisements) made me aware of a treatment or of treatments that I did not know about." (Weissman, 2003)

Patient-physician communication: "(DTC advertisements) helped me to have better discussions about my health with a health professional." (Weissman, 2003)

Responses to both questions were measured with 4-point likert scales: 1= strongly disagree, 2= agree, 3= disagree, 4 = strongly disagree.

Perceived barrier

Unbalanced information: "(DTC advertisements) did not provide information on risks and benefits in a balanced manner." (Weissman, 2003)

Physician's authority: "(DTC advertisements) made me less confident in my physician's judgment." (Weissman, 2003)

The answers to questions about unbalanced information and physician's authority were also measured with 4-point likert scales: 1= strongly disagree, 2= agree, 3= disagree, 4 = strongly disagree.

Perceived severity

"Overall health: overall, how would you describe your health?" (Weissman, 2003)

Five categories were used to measure overall health: 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent. The literature indicated that those who reported they were in fair or poor health were more likely to talk to their physician about advertised drugs, though not more likely to receive a prescription for the medicine (Kaiser, 2001).

Socioeconomic factors

The socioeconomic factors included education, income and prescription insurance coverage.

Education:

Five levels were used to measure education: less than high school graduate (coded 1), high school graduate or equivalent (coded 2), completed some college, but no degree (coded 3), college graduate (code 4), graduate school level and above (coded 5). Education has been identified as an important factor to predict patients' attitude toward DTC advertising. According to Gonul, educated consumers were less likely to trust prescription drug advertisements (Gonul, 2000). We assumed education level has an impact on DTC-prompted visits.

Income:

Income was coded as: 1 = income less than $15000, 2 = income above or equal to $15000 and less than $30000, 3 = income above or equal to $30000 and less than $75000, and 4 = income above or equal to $75000. There was no literature indicating that income has an impact on patient's experience of talking with a physician about advertised prescription drugs. However, studies have reported that income plays an important role in the patient's medical decision making. For instance, higher income groups were more

likely to use prescription drugs for their conditions as compared to lower income groups (Stuart, 1998); and for Medicaid beneficiaries, even small increases in co-pay for "essential" medications could have substantial unintended effects, such as sharp increases in ER visits and outpatient visits because of non-compliance (Soumerai, 1994).

Prescription insurance coverage:

Prescription coverage was coded as: 1 = all prescription expenditures are covered by insurance, 2 = some prescription expenditures are covered by insurance, and 3 = no prescription expenditures are covered by insurance. Advertised prescription drugs were usually more expensive than non-advertised drugs (Kaiser, 2001). Patients had to pay more out of pocket for advertised drugs if they did not have our only had limited prescription drug coverage, which might deter them from visiting their physicians to discuss an advertised prescription drug. A former study has shown that restriction in prescription drug coverage has a significant impact on prescription decisions among vulnerable populations (Soumerai, 1994). We did not include insurance coverage as a predictive variable because normally when a patient has prescription drug coverage they also have coverage for hospital and medical expenses. Putting both insurance variables in a regression model might introduce multicollinearity (Field, 2003).

Health status factors

Health status factors consist of disease conditions, medication use, and healthcare service utilization.

Disease conditions:

In this study, we attempted to explore how different disease conditions interacted with DTC advertising to influence patients' physician visit behavior. Seven chronic conditions were included in the survey and considered for analysis: diabetes, arthritis, allergy, high cholesterol, depression, asthma and anxiety. For each chronic condition, respondents were asked whether a physician or another health professional had told them that they had the condition. If they responded "yes", the variable for that disease condition was given a value of one. If the answer was "no", then that variable was given a value of zero.

No study has investigated how having a particular disease condition would affect one's likelihood of visiting a physician for an advertised drug. We chose the seven chronic disease conditions for study because drugs treating these conditions have been heavily advertised over the years. Examples included Lipitor for high cholesterol, Zoloft for depression, Claritin for allergy, and Vioxx for arthritis.

Medication use

Medication use was defined by whether or not respondents were taking any prescription drugs on a regular basis. If they responded "yes", the variable "medication

use" was given a value of one. If the answer was "no", then the variable was given a value of zero. We assumed that patients who were on their medications on a regular basis were normally concerned with their treatments and visited their physician regularly and, therefore, had more chance to ask their physicians about advertised prescription drugs.

Healthcare service utilization

Healthcare service utilization was assessed as the frequency of physician visits. Participants were asked how long it had been since the last time they visited a physician for non-emergency purposes. The responses to this question included: within the last three months (coded 1), more than three months but less than one year ago (coded 2), and more than one year ago (coded 3). We supposed that patients who use healthcare services frequently have more chances to talk with their physicians about DTC advertisements than those who seldom visit a physician. They thereby were assumed to be more likely to visit their physician for an advertised prescription drug.

Market factors

Market factors were marketing influences on patients when they were exposed to advertisements in mass media campaigns for prescription drugs. Market factors consisted of advertisement attentiveness and advertisement information utilization.

Advertisement attentiveness:

Advertisement attentiveness was defined as patient's attentiveness to DTC advertisements. Since the survey did not include a direct measure of advertising attentiveness, we constructed a proxy variable for this measure. We assumed that those patients having chronic conditions treatable with advertised drugs would be more attentive to DTC advertisements for those drugs; healthy patients or those without the condition would not be interested in the information. Minitz's study has indicated that patients with conditions potentially treatable by advertised drugs were more likely to request advertised drugs (Minitz, 2003). We further assumed that patients' advertisement attentiveness increased with DTC spending on drugs treating their diseases. Thus, the proxy value of "advertisement attentiveness" for each respondent was based on the DTC spending on the drugs used to treat the respondent's chronic conditions.

DTC spending data were available from National Institutes of Health Care Management (NIHCM) annual DTC advertising report. According to the report, the top 50 most heavily advertised drugs accounted for 95 percent of total DTC spending in 2000 (NIHCM, 2001). The DTC spending on the top 50 drugs were classified into different therapeutic categories, including anti-arthritis, anti-depressant, lipid lowering, anti-anxiety, anti-diabetes, and other categories (NIHCM, 2001). Drugs for treating acute diseases were excluded from this study because DTC spending on these drugs was less than 5%, the impact of which could be neglected for this study (NIHCM, 2001).

For each of the seven chronic conditions (diabetes, arthritis, allergy, high cholesterol, depression, asthma, and anxiety), we first coded each chronic condition for each respondent as a dummy variable (0 = without this condition, 1 = with this condition)

We then weighted the dummy variable with annual DTC spending on drugs treating this chronic condition. In some cases, a respondent may have had more than one chronic condition. For instance, if a respondent reported having three chronic diseases, the estimated value of his or her "advertisement attentiveness" can be inferred from the sum of DTC spending on drugs for the three diseases. The calculation formula was as follows:

$$f(x) = \sum \beta_k \, x \; (x = \text{dummy}, k = 1,2,\ldots,7)$$

β = DTC spending on drugs for each chronic condition in 2000

We then used SPSS's "categorize variables" function to convert continuous numeric data to a discrete number of categories. After ranking cases in ascending order, data were categorized based on percentile groups, with each group containing approximately the same number of cases. In our study, a specification of four categories (1 = very low, 2 = low, 3 = high, 4 = very high) would assign a value of 1 to cases below the 25th percentile, 2 to cases between the 26 th and 50th percentile, 3 to cases between the 51st and 75th percentile, and 4 to cases above the 75th percentile. We used this new variable as a proxy variable to estimate the patients' attentiveness to DTC advertisements.

Advertisement information utilization

Advertisement information utilization was measured by asking how often patients get information about health care from advertisements on TV and radio, in newspapers or magazines. Responses were coded as: 1 = never, 2 = hardly ever, 3 = sometimes, and 4 = often. We expected that advertisement information utilization was positively associated with physician visits as a result of DTC advertising.

Demographic factors

Demographic factors were another component of the conceptual framework constructed in this study. They consisted of sex, age, race, and marital status.

Age

Age was self-reported by respondents during the survey. Studies showed that patients' responses to DTC advertisement varied with age (Doucette et al., 1998; Gonul et al., 2000; Kaiser, 2001). Older consumers were less likely to report a desire to seek additional information, such as talking to a physician after exposure to a DTC advertisement. It was reported that older consumers were more likely to trust their physician instead of advertisement (Gonul et al., 2000). We assigned respondents to three age groups: 18 to 34 (coded 1), 35 to 64 (coded 2), 65 and older (coded 3).

Gender

Gender was coded one for male and zero for female. Pyrot found women were more likely to request an advertised prescription drug than men were. However, when his model adjusted for attitudes and exposure to DTC advertisements, no difference was found between genders (Pyrot, 1998).

Race:

In this study, race was coded one for white, two for black and three for other race. A former study indicated that whites were more likely to request an advertised prescription drug than nonwhites in the univariate analysis (Pyrot, 1998). When the model was adjusted for attitudes and exposure to DTC advertisements, no difference was found among races.

Marital status

Marital status was coded as one for single respondents and as zero for non-single respondents. Single respondents included divorced, separated, widowed, single and never married. Non-single respondents included married and living with a partner.

Intervention

The intervention in this study was whether a patient had seen or heard an advertisement for a prescription drug in the past 12 months. Respondents were required to answer with “yes” or “no”. The interventional variable was not added to the regression analysis because only those who had seen or heard an advertisement for a prescription drugs in the past 12 months were asked about their physician visits.

The variables, including three dependent variables and all independent variables used in this study were presented in Table 3.

Data analysis

Statistical analyses were performed with SPSS 11.5 for Windows (SPSS, 2002). We first conducted descriptive analysis on the predictive and dependent variables to understand each variable's characteristics and distribution. We then conducted simple bivariate logistic regression analysis to determine strength and direction of relationship between each independent variable and the dependent variables. The independent variables with a weak or without association with the dependent variables were excluded from the logistic regression models to reduce multicollinearity and simplify the models. We also examined the strength of association among independent variables to identify variables that were highly correlated, so that we could take appropriate measures to address the problem of muticollinearity.

Multicollinearity

Multicollinearity was an important issue that needed to be addressed because over 25 predictive variables were added to each regression model. Multicollinearity was a result of strong correlation between independent variables. The existence of multicollinearity may result in inflation of parameter (coefficient) estimates and consequently incorrect conclusions about the relationship between independent and dependent variables (Field, 2003). Thus, we performed co-linearity diagnostics among the independent variables to examine their tolerance and values of variance inflation factor (VIF). Tolerance values ranged between zero and one and indicated how much variability of one independent variable cannot be explained by other independent variables in the model. The variance

inflation factor (VIF) was 1/Tolerance. It was the degree of inflation in the variances of the parameter (coefficient) estimates due to multicollinearity among the independent variables. There was no gold standard for the cutoff value when using VIF for determining the presence of multicollinearity. In this study, values of VIF exceeding 10.0 were regarded as indicating multicollinearity (Greene, 1997).

Multivariate analyses

Three multivariate logistic regression models were constructed to test the effects of the predictive factors in our model on DTC-prompted visits. Just like linear regression, logistic regression gives each regressor a coefficient or parameter estimator β_1 which measures the regressor's independent contribution to variations in the dependent variable. In a logistic regression, the dependent variable is a binary variable with values of 0 and 1. The advantage of logistic regression is that it makes no assumptions about the distribution of the independent variables. They do not have to be normally distributed or of equal variance within each group (Lattin at el., 2003; Field, 2003). The relationship between the predictor and response variables was not a linear function in logistic regression. Instead, the logistic regression function was used, which was the logit transformation of θ:

$$\theta = \frac{e^{(\alpha+\beta_1 x_1+\beta_2 x_2+\ldots+\beta_i x_i)}}{1+e^{(\alpha+\beta_1 x_1+\beta_2 x_2+\ldots+\beta_i x_i)}}$$

An alternative form of the logistic regression equation is:

$$\mathbf{logit}\left[\theta(\mathbf{x})\right] = \mathbf{log}\left[\frac{\theta(x)}{1-\theta(x)}\right] = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_i x_i$$

In the above model, the logit transformation of θ on the left side of the function stands for the logit transformation of dependent variable (visit for prescription drug, or visit for new condition, or visit for treatment change). The variables x_1 …. x_k represent each of the independent variables from five groups of factors. We included different independent variables from five groups of factors (personal beliefs, demographic factors, socioeconomic factors, health status factors and market factors) in each logistic regression model. α is the constant of the equation. β_1 …. β_i is the coefficient of each independent variable. Our hypothesis was that $\beta_1 = \beta_2 = \beta_3 \ldots = \beta_i = 0$, which assumed that there is no statistically significant relationship between each independent variable and the dependent variables (visit for prescription drug, or visit for new condition, or visit for treatment change).

In the logistic regressions, Wald chi-square tests were conducted to test the significance level of each regressor. Reference groups were used when the categorical variables had more than two categories or levels. Usually the reference group is the lowest level.

CHAPTER 4

RESULTS

In Chapter 3, we discussed the data sources used for the study, operationalized the dependent and independent variables, and described statistical procedures for analyses. In this chapter, we will present the study results.

1. Descriptive analyses

The characteristics of respondents are presented in Table 5. Among the respondents, 48% were females and 80% were white. Most respondents were between 35 and 64 years of age with annual income of $30,000 or more. Most were fully or somewhat covered with prescription drug insurance (including Medicare or Medicaid), but 20% of respondents had no prescription insurance coverage. This sample of 3000 respondents was demographically similar to the U.S. population as described in the March 2001 Current Population Survey from the U.S. Census Bureau (Weissman, 2003). The descriptive analysis of dependent variables and the intervention are listed in Table 6. In the past 12 months, 86% of respondents had seen or heard an advertisement for prescription drugs. Among the respondents, 27% had been prompted talk to a physician about a prescription drug for themselves; 16% had been prompted to talk about a new health condition of their own; 17% had been prompted to ask their physician about a possible change to new treatment.

2. Multicollinearity

We ran multicollinearity tests to examine the relationships between independent variables. We wanted to find how much variability of one independent variable can be explained by other independent variables in the model. If other independent variables can explain most of the variance of an independent variable, there exits multicolinearity between this independent variable and other ones. The existence of multicollinearity may result in inflation of coefficient estimates in multivariate models, and consequently incorrect conclusions about the relationship between the independent and dependent variables (Field, 2003). One way to deal with multicollinearity is to exclude one of each pair of highly correlated independent variables from the multivariate regression model (Field, 2003) In this study, a value of the variance inflation factor (VIF) exceeding 10 was regarded as an indication of multicollinearity (Greene, 1997; Field et al., 2000). Co-linearity diagnostic tests showed that most independent variables' VIF values were lower than 3. (See Table 7.) The exception was "advertisement attentiveness" (VIF = 6.28). Its VIF was higher than 3, but still lower than the cutoff value of 10. Since no apparent multicollinearity was found among the independent variables, the parameter estimates (coefficients) in the logistic regression models was unlikely to be inflated.

3. Outcomes on visit to discuss prescription drug

3.1. Bivariate analyses

The purpose of the bivariate analysis was to identify the strength and direction of the association between the dependent variable ("visit for prescription drug") and individual independent variables. If we found there was no or very weak association between the dependent variable and an independent variable, the particular variable would be excluded from the multivariate regression model in order to reduce multicollinearity and simplify the models. We used a cutoff value of p = 0.25 (Hosmer et al., 2000). Since the dependent variable and independent variables were categorical, we ran Pearson chi-square tests to examine the relationship between the dependent variable and each independent variable. Bivariate analyses showed that marital status was not associated with visit for prescription drug (p = 0.85). Hence, marital status was excluded from the multivariate analysis. All other independent variables were associated with visit for prescription drug. The results of Pearson chi-square tests were shown in Table 8.

3.2 Mutivariate analysis

3.2.1. Model evaluation

Stepwise logistic regression was conducted to determine which independent variables were predictors of visit for prescription drug. After running stepwise logistic regression, only nine variables stayed in the model. The variables with significant effects are listed in Table 9. Hosmer and Lemeshow's Goodness-of-fit test statistic (Hosmer et al., 2000) was much greater than 0.05 (p= 0.863). This suggested no significant difference between the observed and model-predicted values of the dependent variable. Therefore, the model's estimates fitted the data at an acceptable level. Regression results indicated the

overall model was statistically reliable in distinguishing between visit for prescription drug and no visit for prescription drug. (-2 log Likelihood = 1888.73; Chi-square = 797.1, df = 19, $p < 0.0001$). The model correctly classified 93.8% of those in the "no visit" and 48.5% of those in the "visit" category.

3.2.2 Model outcomes for research hypothesis: H1 and H2

The first hypothesis of this study was that there was a statistically significant relationship between patients' individual characteristics and whether or not they would talk with their physician about a prescription drug prompted by DTC advertisement. The second hypothesis of this study was that there was a statistically significant relationship between patients' personal beliefs and whether or not they would talk with their physician about a prescription drug prompted by DTC advertisement. We used "visit for prescription drug" as the dependent variable and variables from the five groups of factors (demographics, socioeconomics, health status, market factor, and personal belief) as independent variables to test the two hypotheses. The findings of logistic regression analyses are presented as follows (see Table 9).

a. Effect of demographic factors

We found no evidence of association between visit for prescription drug after seeing or hearing a DTC advertisement and any demographic factors (race, gender, age, and marital status).

b. Effect of socioeconomic factors

We also found no evidence of association between visit for prescription drug after seeing or hearing a DTC advertisement and any socioeconomic factors (income, education, and prescription drug coverage).

c. Effect of health status factors

The odds of visiting for prescription drug for patients on regular medications were 1.6 times as high as the odds for those who were not on regular medications ($p < 0.0001$). Patients with depression ($p = 0.016$) and patients with anxiety ($p = 0.028$) were more likely to visit to discuss prescription drug after seeing or hearing a DTC advertisement than those without such disease conditions. (Table 9.)

d. Effect of personal beliefs

Three variables measuring subjective norms showed significant associations with the dependent variable ("visit for prescription drug"). Two of these variables measured information source utilization. We found that visiting for prescription drug after seeing or hearing a DTC advertisement was associated with the frequency of getting health information from a physician. Specifically, a patient who often ($p = 0.009$) consulted a physician had a higher chance to visit for prescription drug than those who never did so. Patients who often ($p = 0.014$) or sometimes ($p = 0.006$) consulted a pharmacist had a higher chance to be prompted by DTC advertisements to visit their physician to discuss a prescription drug than those who never consulted a pharmacist. The odds of visiting for

prescription drug for patients who viewed media as the most important source prompting them to talk with their physician were almost 11 times as high as those who did not. ($p < 0.0001$) (Table 9.)

Patients' attitudes towards DTC advertising demonstrated strong association with their behaviors of visiting for prescription drug. Those who somewhat agreed ($p < 0.0001$) or strongly agreed ($p < 0.0001$) that DTC advertisements increased awareness of new treatment were much more likely to visit to discuss prescription drugs than those who strongly disagreed. At the same time, the odds of another perceived benefit, better discussion with health professionals, were also significantly different between the somewhat agree/strongly-agree groups and the strongly-disagree group. Those who somewhat agreed ($p < 0.0001$) or strongly agreed ($p < 0.0001$) were more likely to visit for prescription drug after seeing or hearing a DTC advertisement than those who strongly disagreed.

No evidence of association was found between visit for prescription drug after seeing or hearing a DTC advertisement and perceived barrier or perceived severity. (Table 9.)

e. Effect of market factors

Advertisement attentiveness was strongly associated with the dependent variable ("visit for prescription drug"). ($p < 0.0001$) In this study, patients with a high level of advertisement attentiveness were defined as those who suffered from multiple chronic conditions that have attracted substantial DTC advertising expenditure. Patients with high

($p = 0.003$) or very high ($p < 0.0.001$) advertisement attentiveness were more likely to visit their physician for prescription drug after seeing or hearing a DTC advertisement than those with very low advertisement attentiveness. (Table 9.)

3.2.3 Summary of model results for hypothesis: H1 and H2

The results of the logistic regression analysis supported our first hypothesis that there was a statistically significant relationship between patients' individual characteristics and whether or not they would talk with their physician about a prescription drug prompted by DTC advertisement. Specifically, patients on regular medications, patients with depression or anxiety, or patients with high advertisement attentiveness were more likely to visit their physician to discuss a prescription drug after seeing or hearing DTC advertisements. The results of the regression analysis also supported our second hypothesis that there was a statistically significant relationship between patients' personal beliefs and whether or not they would talk with their physician about a prescription drug prompted by DTC advertisement. Patients who viewed media as the most important source prompting them to talk with their physician, patients who often got health information from a physician or a pharmacist, and those who had positive attitudes towards DTC advertisements were more likely to visit their physician to discuss a prescription drug as a result of DTC advertisements.

4. Outcomes on visit to discuss new health condition

4.1. Bivariate analyses

Pearson chi square analyses showed that race, marital status, income, prescription drug coverage, and diabetes were not associated with visit for new condition. Hence, these five variables were excluded from multivariate analyses. All other independent variables were associated with the dependent variable. The results of Pearson chi-square tests were shown in Table 8.

4.2 Mutivariate analyses

4.2.1. Model evaluation

After running stepwise logistic regression, only eight variables stayed in the model. The variables with significant effects were listed in Table 10. Hosmer and Lemeshow's Goodness-of-fit test statistic (Hosmer et al., 2000) was much greater than 0.05 ($p= 0.51$). It suggested no significant difference between the observed and model-predicted values of the dependent variable. Therefore, the model's estimates fitted the data at an acceptable level. Regression results indicated the overall model was statistically reliable in distinguishing between visit for new condition and no visit for new condition. (-2 log Likelihood = 1699.66; Chi-square = 493.9, df = 18, $p < 0.0001$). The model correctly classified 96.5% of those in the "no visit" and 23.9% of those in the "visit" category.

4.2.2 Model outcomes for research hypothesis: H3 and H4

The third hypothesis of this study was that there was a statistically significant relationship between patients' individual characteristics and whether or not they would talk

with their physician about a new health concern prompted by DTC advertisement. The fourth hypothesis of this study was that there was a statistically significant relationship between patients' personal beliefs and whether or not they would talk with their physician about a new health concern prompted by DTC advertisement. We used "visit for new condition" as the dependent variable and variables from the five groups of factors (demographics, socioeconomics, health status, market factor, and personal belief) as independent variables to test the two hypotheses. The findings of logistic regression analyses are presented as follows: (see Table 10.)

a. Effect of demographic factors

We found no evidence of association between visit for new condition after seeing or hearing a DTC advertisement and any demographic factors (race, gender, age, and marital status).

b. Effect of socioeconomic factors

We also found no evidence of association between visit for new condition after seeing or hearing a DTC advertisement and any socioeconomic factors (income, education, and prescription drug coverage).

c. Effect of health status factors

Patients with arthritis ($p < 0.0001$) and patients with anxiety ($p < 0.0001$) were more likely to visit for new condition after seeing or hearing a DTC advertisement than those without such disease conditions. (Table 10.)

d. Effect of personal beliefs

There were three variables measuring subjective norms that showed significant effects on the dependent variable ("visit for new health condition"). Two variables measured information source utilization. We found that visiting for new condition after seeing or hearing a DTC advertisement was associated with the frequency of getting health information from a pamphlet in a physician's office or waiting room ($p < 0.0001$). Specifically, patients who often ($p < 0.0001$) got health information from pamphlets had a higher chance to visit their physician for new condition than those who never did so. Visiting for new condition after seeing or hearing a DTC advertisement was also associated with the frequency of getting health information from family and friends ($p = 0.02$). However, no significant differences were found between the "never" group and any other groups. Odds of visiting for new condition for the patients who viewed media as the most important source prompting them to talk with their physician were almost 5 times as high as those who did not. ($p < 0.0001$) (Table 10.)

Patients' attitudes towards DTC advertising demonstrated strong association with their behaviors of visiting for new condition. Those who somewhat agreed ($p = 0.001$) or strongly agreed ($p < 0.0001$) that DTC advertisements increased awareness of new treatments were much more likely to visit for new condition than those who strongly

disagreed. At the same time, the odds of another perceived benefit, better discussion with health professionals, were also significantly different between the somewhat agree/strongly-agree groups and the strongly-disagree group. ($p < 0.0001$) Those who somewhat agreed ($p < 0.0001$) or strongly agreed ($p < 0.0001$) were much more likely to visit for new condition after seeing or hearing a DTC advertisement than those who strongly disagreed. Moreover, believing that DTC advertisements did not provide information on risks and benefits in a balanced manner was negatively associated with patient's health behavior of visiting for new condition. ($p = 0.037$). However, no significant differences were found between the strongly-disagree group and any other groups. No evidence of association was found between visit for new condition after seeing or hearing a DTC advertisement and perceived severity. (Table 10.)

e. Effect of market factors

There was no evidence of association between visit for new condition after seeing or hearing a DTC advertisement and advertisement attentiveness.

4.2.3 Summary of model results for hypothesis: H3 and H4

The results of the logistic regression analysis supported our third hypothesis that there was a statistically significant relationship between patients' individual characteristics and whether or not they would talk with their physician about a new health concern prompted by DTC advertisement. Specifically, patients with arthritis or anxiety were more likely visit their physician to discuss a new health concern after seeing or hearing DTC

advertisements. The results of the regression analyses also supported our fourth hypothesis that there was a statistically significant relationship between patients' personal beliefs and whether or not they would talk with their physician about a new health concern prompted by DTC advertisement. Patients who viewed media as the most important source prompting them to talk with their physician, patients who often got health information from family and friends, or from a pamphlet in a doctor's office or waiting room, and those who had positive attitudes towards DTC advertisements were more likely to visit their physician to discuss a new health concern as a result of DTC advertisements.

5. Outcomes on visit to discuss treatment change

5.1. Bivariate analyses

Pearson chi square analyses showed that marital status and income were not associated with visit for treatment change. Hence, marital status and income were excluded from multivariate analyses. All other independent variables were associated with the dependent variable (Table 8).

5.2 Mutivariate analyses

5.2.1. Model evaluation

After running stepwise logistic regression, ten variables stayed in the model (Table 11). Hosmer and Lemeshow's Goodness-of-fit test statistic (Hosmer et al., 2000) was much greater than 0.05 ($p= 0.80$). Regression results indicated the overall model was

statistically reliable in distinguishing between visit for treatment change and no visit for treatment change. (-2 log Likelihood = 1621.48; Chi-square = 606.50, df = 23, $p < 0.0001$). The model correctly classified 96.8% of those in the "no visit" and 32.1% of those in the "visit" category.

5.2.2 Model outcomes for research hypothesis: H5 and H6

The fifth hypothesis of this study was that there was a statistically significant relationship between patients' individual characteristics and whether or not they would talk with their physician about change in treatment prompted by DTC advertisement. The sixth hypothesis of this study was that there was a statistically significant relationship between patients' personal beliefs and whether or not they would talk with their physician about change in treatment prompted by DTC advertisement. We used "visit for treatment change" as the dependent variable and variables from five groups of factors (demographics, socioeconomics, health status, market factor, and personal belief) as independent variables to test the two hypotheses. The findings of logistic regression analyses are presented as follows. (see Table 11.)

a. Effect of demographic factors

Race was the only demographic factor associated with patient's visit for treatment change. Visits for treatment change were more likely to happen among black patients than among patients of races other than black or white. ($p = 0.001$). No difference was found between white patients and those from other races. (Table 11.)

b. Effect of socioeconomic factors

We found no evidence of association between visit for treatment change after seeing or hearing a DTC advertisement and any socioeconomic factors (income, education, and prescription drug coverage).

c. Effect of health status factors

The odds of visit to discuss treatment change for patients on regular medications were 2.1 times as high as the odds for those who were not on regular medications ($p < 0.0001$). Patients with anxiety ($p = 0.003$) were more likely to visit for treatment change after seeing or hearing a DTC advertisement than those without anxiety. (Table 11.)

d. Effect of personal beliefs

There were three variables measuring subjective norms that showed significant effects on the dependent variable ("visit for treatment change"). Two variables measured information source utilization. We found that visit for treatment change after seeing or hearing a DTC advertisement was associated with the frequency of getting health information from Internet websites ($p = 0.037$). Specifically, patients who often ($p = 0.008$) searched Internet web sites for health information were more likely to visit their physician for treatment change than those who never did so. Patients who often ($p = 0.004$) or sometimes ($p = 0.044$) consulted a pharmacist were more likely to be prompted by DTC advertisements to visit their physician for treatment change than those who never consulted

a pharmacist. The odds of visiting for treatment change for patients who viewed media as the most important source prompting them to talk with their physician were almost 5 times as high as those who did not. ($p < 0.0001$) (Table 11.)

Patients' attitudes towards DTC advertising demonstrated strong association with their behaviors of visiting for treatment change. Those who somewhat agreed ($p = 0.029$) or strongly agreed ($p = 0.0001$) that DTC advertisements led to increased awareness of new treatment were much more likely to visit for treatment change than those who strongly disagreed. At the same time, the odds of another perceived benefit, better discussion with health professionals, were also significantly different between the somewhat agree/strongly-agree group and the strongly-disagree group. ($p < 0.0001$) Specifically, those who somewhat agreed ($p < 0.0001$) or strongly agreed ($p < 0.0001$) were much more likely to visit for treatment change after seeing or hearing a DTC advertisement than those who strongly disagreed. ($p < 0.0001$). Moreover, believing that DTC advertisements made one less confident with physician's judgment was negatively associated with the patients' health behavior of visiting for new condition. ($p = 0.034$). However, a significant difference only showed between strongly-disagree group and somewhat-agree group. ($p = 0.007$) No evidence of association was found between visit for treatment change after seeing or hearing a DTC advertisement and perceived severity. (Table 11.)

e. Effect of market factors

Advertisement attentiveness was strongly associated with the dependent variable ("visit for treatment change"). ($p < 0.0001$) Patients with high levels of advertisement

attentiveness were defined as those who suffered from multiple chronic conditions that have attracted substantial DTC adverting expenditure. Patients with high ($p < 0.0001$) or very high ($p < 0.0001$) advertisement attentiveness were more likely to visit to discuss treatment change than those with very low advertisement attentiveness. (Table 11.)

5.2.3 Summary of model results for hypothesis: H5 and H6

The results of the logistic regression analysis supported the fifth hypothesis that there was a statistically significant relationship between patients' individual characteristics and whether or not they would talk with their physician about change in treatment prompted by DTC advertisement. Specifically, patients on regular medications, black patients, patients with anxiety, and patients with high advertisement attentiveness were more likely to visit their physician to discuss change in treatment after seeing or hearing DTC advertisements. The results of the regression analysis also supported our sixth hypothesis that there was a statistically significant relationship between patients' personal beliefs and whether or not they would talk with their physician about change in treatment prompted by DTC advertisement. Patients who viewed media as the most important source prompting them to talk with their physician, patients who often got health information from Internet or a pharmacist, and those who had positive attitudes towards DTC advertisements were more likely to visit their physician to discuss change in treatment as a result of DTC advertisements.

CHAPTER 5

DISCUSSION

Based on a conceptual framework, we built three regression models in order to identify the strongest predictors of DTC-prompted physician visits. The dependent variables of the three regression models were "visit for prescription drug", "visit for new condition", and "visit for treatment change". In our study, if an independent variable was found to be significantly related to all three dependent variables, it was deemed a strong predictor of DTC-prompted visits. The three dependent variables were similar in that they measured DTC advertisements' influence on patients' physician visit behavior. They differed in that they measured physician visits for different purposes

Strongest predictors of DTC-prompted visits

We found that out of all independent variables, only five variables consistently showed significant effects on the three dependent variables after adjusting for other variables. They were: 1) taking medication on regular basis, 2) anxiety, 3) viewing media as the most important source prompting one to talk with physician, 4) believing that DTC advertisements increased awareness of new treatment, and 5) believing that DTC advertisements improved discussion with health professionals. Therefore, these five variables were considered to be the strongest predictors for DTC-prompted physician visits.

Taking prescription drugs on a regular basis was one of the strongest predictors of DTC-prompted visits. It supported the hypothesis that patients with chronic conditions potentially treatable by the advertised drugs would be interested in the DTC advertisements and visit their physician to request or discuss advertised drugs (Mintzes et al., 2003). Anxiety was the only chronic condition showing significant association with all types of physician visits, though we also found patients with two other chronic diseases, depression and arthritis, were more likely to be prompted by DTC advertisements to visit their physician for two of the three types of visits. The results were consistent with other research outcomes (Sumpradit, 2002; Mintzes et al., 2003). The significant effects could be attributed to the similar characteristics that these disease conditions shared, such as being chronic, common, highly symptomatic, troublesome to patients, and treated with drugs with high annual spending on DTC advertising (NIHCM, 2001). In addition, anxiety could have an additional, psychological effect in influencing patients' physician visit behavior. Patients with anxiety are more likely to worry, especially about their health status. Therefore, they would be more sensitive to the symptoms described in the DTC advertisements, wondering if they had similar symptoms. As a result, they may be prompted to visit their physicians.

The major variables adopted from the Theory of Reasoned Action and Health Belief Model were strong determinants for each type of DTC-prompted physician visit. These personal belief variables included subjective norm, perceived benefit, and perceived barrier. In our study, patients who viewed media as the most important source prompting them to talk with their physicians were much more likely to visit their physician than those

who viewed non-media as more important referent sources. Mintzes also reported similar results that those with greater reliance on advertising requested more advertised drugs (Mintzes et al., 2003). Two of the other strongest predictors were believing that DTC advertisements increased awareness of new treatment (perceived benefit) and believing that DTC advertisements improved discussion with health professionals (perceived benefit). Our findings agreed with Sumpradit's study results, which showed positive association between positive attitude toward DTC advertisements and consumer's willingness of talk with physicians about advertised drugs (Sumpradit et al., 2002).

Advertisement attentiveness was significantly related to visit for prescription drug and visit for treatment change but not to visit for new condition. Our assumption was that advertisement attentiveness exists only when patients have been told by health care professionals that they suffer from conditions and when these conditions are potentially treatable by advertised drugs. A new condition is, by definition, one that a patient has not yet discussed with a health professional. So conceptually, visit for new condition would not be related with advertisement attentiveness as we measured it. Because advertising attentiveness was significantly related to both visit for prescription drug and visit for treatment change, and because conceptually it should not be related to visit for new condition, we also deemed advertisements attentiveness as one of the strongest predictors for physician visits.

This study contributed to the literature of how DTC advertising influenced patients' health behavior in several ways. First, it updated our knowledge about the consequences of DTC advertisements, such as physician visits and attitudes towards advertisements. In

addition, our study provided a conceptual framework of how DTC advertisements influenced patients' physician visits for different purposes while most previous studies only examined one type of physician visit. For instance, Mintzes (Mintzes et al, 2002) and Pyrot (Pyrot et al, 1998) analyzed the factors affecting patients' request behavior but failed to address other types of physician visits, such as visit to discuss new health conditions or information on prescription drug. Finally, this study tested the conceptual framework with a nationally representative sample. Most previous studies were limited in terms of their sample size, location, or differences in nationality and healthcare system.

Implications

The study had important practical implications to pharmaceutical marketers. Some pharmaceutical manufacturers have apparently believed that that selling to the widest possible market is the likeliest path to success. However, this "take-all-customers" approach was not very productive. It was hard to generate cost effective sales when delivering promotional information to the broad audience without targeting individual differences. A more efficient way may be to narrow marketing focus and customize product messages before disseminating DTC advertisements. Accurate target market selection is crucial to productive marketing efforts. To achieve this, a target market must be a narrowly defined consumer group consisting of individuals with specialized characteristics and having strong desires for what the marketer can offer. DTC advertising campaigns may have been less cost-effective because pharmaceutical marketers did not aim their efforts at appropriate customer groups.

Marketers can use our findings to accurately identify target markets. Our study revealed that patients regularly taking medications and those who had anxiety were more likely to respond to DTC advertising. Hence, as better potential customers, they could be identified as important target markets for specialized DTC advertising. With a higher probability of DTC-prompted physicians visits, equal expenditures on marketing promotions could achieve higher returns on investments from these patient groups.

Advertisement attentiveness is a proxy variable based on patients' chronic conditions and annual DTC spending on these conditions. Pharmaceutical companies could target more marketing to those consumers who have multiple, heavily advertised chronic conditions. Related information could be acquired from medical records, regional or national marketing data sources, i.e. IMS or Scott-Levin databases.

Personal beliefs about DTC advertisements were also strong predictors for all types of physician visit behaviors. According to our findings, patients with positive attitudes toward DTC advertisements or patients viewing media as the most important source prompting them to talk with physicians were more likely to respond to advertisements. Pharmaceutical marketers may be able to identify patients on regular medications, those having anxiety, and those with high potential advertisement attentiveness from their medical records or pharmacy claims databases. However, it is not possible to get information on patients' personal beliefs from these sources. Therefore, in order to target these consumers, pharmaceutical marketers could develop interactive tactics to acquire information with advanced Internet technologies. For instance, marketers could post personal belief questions on web sites for medical information or pharmaceutical

products. They could then develop direct response technologies on the Internet to send customized letters and brochures to respondents based on the answers that respondents give to questions about their personal beliefs.

Limitations

Several limitations should be noted when considering our results.

First, we lacked information on how many physician visits each patient had made as a result of DTC advertisements and how appropriate or necessary the physician visits were. Though Weissman's study has reported that no worse heath outcomes were found among patients who visited their physician for advertised drugs than those who did not, further study still needs to examine DTC advertisements' long-term effects on health outcomes (Weissman et al., 2003).

Second, our data on medication utilization and health conditions were collected by survey. Therefore, they may be subject to self-report bias. However, previous studies have evaluated the accuracy and reliability of self-reported medication use and chronic conditions. These studies revealed consistency between database information and self-report results (Boudreau et al. 2003; Brown et al., 1992; West et al., 1995). For example, Boudreau's study explored the accuracy of self-reported use of commonly used medications among older women (n = 403). Pharmacy records of statin, antihypertensive, and antidepressant medication utilizations were used as the "gold standard" to compare with patients' interview data. Information on the brand name, strength, directions for use indications for use, and start and stop dates were collected for comparison. The study

showed that the sensitivity of self-reported data ranged from 79% to 92% for antihypertensive use, from 67% to 93% for statin use, and from 44% to 66% for antidepressant use. Specificity was high among all drug classes, ranging form 91% to 100%. Recall for recent medication use (previous 6-month period) revealed higher accuracy than older periods (previous 2-year and 8-year period).

Third, we calculated and scaled patients' advertisement attentiveness based on assumptions. We supposed that all patients had an equal chance of viewing DTC advertisements and that only patients with conditions that were potentially treatable by the promoted drugs would be interested in the DTC advertisements. However, this could be confounded by other factors, such as satisfaction with current treatments, accessibility to cable TV, content of DTC advertisements, or geographic locations.

Fourth, other external factors may influence the outcomes. Our study analyzed the influence of DTC advertising on physician visits based on the differences in personal characteristics, including demographics, socioeconomics, personal beliefs, health status, and market influence on patients. Other external factors, such as type of health insurance, patients' relationship with their physicians, satisfaction with their current treatments, may also interact with DTC advertisements to change patients' physician visit behaviors. Since we used secondary data for analyses, we lacked information on these external factors. It would be helpful in future research to add these external factors for analysis.

Fifth, our study did not examine the interaction effects between independent variables. For instance, income may interact with age's influence on physician visit. In the high-income population, old patients maybe more likely to visit physician than the younger

patients, while in the low-income population, the old patients maybe less likely to visit physician than the younger ones. Similar situation may also exist among other demographic or socioeconomic factors. Hence, future research should also consider the interaction effects for study.

Sixth, although we have described how patients' attitudes and personal beliefs can be measured using Internet interactive technologies, it is more difficult to use these practices to target patients using the more traditional media such as TV or radio. Demographic information, such as age or race, would be more useful to apply to target consumers on TV or radio. Studies that examine the sole effects of demographic factors on physician visits are recommended for future research.

Conclusion

Our nationally representative study found multiple factors that were associated with different types of physician visits prompted by DTC advertisements. According to these factors, we decided what kinds of patient would be most likely to talk to their physicians as a result of DTC advertisements. Patients on regular medications, those with anxiety, those with high advertisement attentiveness, patients who viewed media as the most important source prompting them to talk with their physician, and patients with positive attitudes toward DTC advertisements consistently showed significant relationships with each type of physician visit. Patients with these characteristics were more likely to talk to their physicians when prompted by DTC advertisements.

Table 1.

U.S. Promotional Spend by Direct-to-Consumer Advertising, 2003

Promotion Spend (U.S. Millions $)	1996	1997	1998	1999	2000	2001	2002	2003
Direct-to-Consumer (DTC)	791	1,069	1,317	1,848	2,467	2,679	2,638	3,235

Note: Direct-to-Consumer (DTC) expenditures include advertising spending on television, magazines and newspapers, on radio and outdoors.

Source: IMS Health, Integrated Promotional Services™ and CMR, 6/2004

Table 2.

Year 1998-2000 Average Return-on-Investments by Brand Revenue for Different Promotion Tactics

Revenue Level	Return-On-Investment (ROI) of Promotions (1998-2000)			
	DTC advertising	Detailing	Journal Advertising	Physician Meeting & Events
$25 - $100MM	$0.0	$1.0	$7.2	$0.1
$100 -$500MM	$0.2	$2.1	$4.2	$3.6
$500+MM	$1.3	$11.6	$12.2	$11.7

ROI: Return-on-Investment

MM: Million

Source: Return on Investment Analysis of Pharmaceutical Promotion (RAPP), 2002

Table 3.

List of Variables and Measurements

Dimension	Variable	Measurement
Outcome (1)	Visit for Prescription drug	Q448* Has an ad for a prescription drug ever prompted you to talk to a doctor about a prescription drug for yourself?
Outcome (2)	Visit for New condition	Q452 Has an ad for a prescription drug ever prompted you to talk to a doctor about a medical condition, illness, or other health concern of your own that you had not discussed with a doctor before?
Outcome (3)	Visit for Treatment change	Q456 Has an ad for a prescription drug ever prompted you to talk to a doctor about a possible change in treatment for a medical condition or illness that you already had?
Personal Beliefs	Subjective Norm	
	1) Source importance	Q608 Which one of the sources is most important in prompting you to talk to your doctor? (Media or non-media)
	2) Source utilization	Q265 How often do you get information about health from (source)? (TV/radio, internet, newspapers or magazines, family and friends, a pharmacist, pamphlets in a doctor's office or waiting room, a doctor)
	Perceived Benefit	
	1) Awareness of treatments	Q410-1 (DTC ads) made me aware of treatment that I did not know about
	2) Patient-physician communication	Q410-5 (DTC ads) helped me to have better discussions about my health with a health professional
	Perceived Barrier	
	1) Unbalanced Information	Q410-3 (DTC ads) did not provide information on risks and benefits in a balanced manner
	2) Physician's Authority	Q410-4 (DTC ads) made me less confident in my doctor's judgment

	Perceived Severity Overall health	Q214 Overall, how would you describe your health?
Health Status Factors	Healthcare service utilization	Q218 How long has it been since the last time your saw a doctor where you talked about a condition?
	Disease conditions	Q255 Have you ever been told by a doctor that you have any of the following conditions? (Seven chronic conditions: diabetes, depression, arthritis, allergies, high cholesterol, asthma or other problems with lungs, and anxiety)
	Medication use	Q230 Do you currently take any prescription drug on a regular basis?
Socioeconomic Factors	Prescription insurance coverage	Q820 Does your insurance or health plan pay for all, some, or none of the costs of Rx drugs you get at the pharmacy or through the mail?
	Education	Q110 What is the highest level of education you have completed or the highest degree you have received?
	Income	Q142 Which of the following income categories best describes your total 2000 household income before taxes?
Market Factors	Advertisement attentiveness	The proxy value of "advertisement attentiveness" for each respondent was based on the DTC spending on the drugs used to treat the respondent' chronic conditions
	Advertisement information utilization	Q265c How often do you get information about health care from ads on TV or radio, in newspapers or magazines?
Demographic Factors	Gender	Q210 Respondent sex
	Race	Q122 Do you consider yourself (race)?
	Age	Q104 What is your year of birth?
	Marital status	Q109 Which of these best describes your marital status?

Note: * Q # represents questions number in the questionnaire.
** See table 4.

Table 4.

DTC Advertisement Spending by Therapeutic Class in 2000

Diseases	DTC spending ($Million)
Diabetes	76.10
Depression	115.10
Athritis	265.00
Allergies	252.00
Athma/lung problem	279.40
Anxiety	77.30
High Cholesterol	211.20

Source: National Institute of Healthcare Management (NIHCM) Foundation, Prescription Drugs and Mass Media Advertising: 1999 - 2000, Med Ad News and Scott-Levin Year 2000 Prescription Audit Data

Table 5. (1)

Descriptive Analyses: Demographic and Socioeconomic Factors

Respondent characteristics	N	%
Demographic factors		
Gender		
Female	1560	48.0
Male	1440	52.0
Race		
White	2363	80.0
Black	295	10.0
Other race	295	10.0
Age		
18-34	834	27.8
35-64	1591	53.0
65+	575	19.2
Marital Status		
Non-single (e.g. married, living with a partner)	1726	57.9
Single (e.g. divorced, separated, window)	1257	42.1
Socioeconomic Factors		
Education		
Less than high school graduate	259	8.7
High school graduate or equivalent (e.g., GED)	883	29.6
Completed some college, but no degree	683	22.9
College graduate (e.g., B.A., A.B., B.S.)	777	26.0
Graduate school level	384	12.9
Income		
Poor (Less than $15,000)	319	11.9
Lower income ($15,000 to $29,999)	355	13.2
Middle income ($30,000 to $74,999)	1409	52.4
High income ($75,000 or more)	606	22.5
Prescription Drug Coverage by Insurance		
All	408	14.0
Some	1929	66.0
None	587	20.0

Table 5. (2)

Descriptive Analyses: Health Status Factors

Respondent characteristics	N	%
Use of healthcare services		
How long has it been since you last saw a doctor where you talked about health condition or concern of your own?		
Within the last three months	1610	54.0
More than three months, but less than one year ago	754	25.2
More than one year ago	620	20.8
Whether on any medication		
Do you currently take any prescription drug on a regular basis?		
Yes	1588	53.1
No	1404	46.9
Different disease conditions		
Been told have condition:		
Diabetes		
Yes	228	7.6
No	2764	92.4
Depression		
Yes	378	12.6
No	2614	87.4
Arthritis		
Yes	631	21.1
No	2356	78.9
Allergies		
Yes	822	27.5
No	2163	72.5
High cholesterol		
Yes	634	21.3
No	2341	78.7
Asthma or other problems with your lungs		
Yes	361	12.1
No	2632	87.9
Anxiety		
Yes	327	10.9
No	2662	89.1

Table 5. (3)

Descriptive Analyses: Market Factors

Respondent characteristics	N	%
Advertisements Information Utilization		
Get health care information from: Advertisements on TV or radio, in newspapers or magazines		
Often	781	26.1
Sometimes	902	30.2
Hardly Ever	679	22.7
Never	626	21.0
Advertisement attentiveness		
Very high	726	24.7
High	820	27.9
Low	170	5.7
Very low	1227	41.7

Table 5. (4)

Descriptive Analyses: Personal Beliefs

Respondent characteristics	N	%
Subjective Norm		
1) **Referent Source:**		
Which one of the sources is most important in prompting you to talk to your doctor?		
Non-media source (i.e. doctors, pharmacists, friends)	2653	90.5
Media source (i.e. TV, radio, paper, Internet)	279	9.5
2) **Source utilization**		
How often do you get information about health from…?		
Television or radio, not including ads		
Often	452	15.2
Sometimes	933	31.3
Hardly Ever	800	26.8
Never	795	26.7
Internet websites		
Often	254	8.5
Sometimes	521	17.4
Hardly Ever	527	17.6
Never	1692	56.5
Newspapers or magazines, not including ads		
Often	540	18.1
Sometimes	955	32.1
Hardly Ever	733	24.6
Never	751	25.2
Family and friends		
Often	603	20.2
Sometimes	1108	37.2
Hardly Ever	733	24.6
Never	536	18.0
A doctor		
Often	884	30.0
Sometimes	1122	38.1
Hardly Ever	623	21.2
Never	313	10.6

Table 5. (5)

Descriptive Analyses: Personal Beliefs (continued)

Respondent characteristics	N	%
2) **Source utilization (continued)** How often do you get information about health from…?		
Pamphlets in a doctor's office or waiting room		
Often	379	12.7
Sometimes	1047	35.2
Hardly Ever	843	28.3
Never	709	23.8
A pharmacist		
Often	335	11.3
Sometimes	734	24.7
Hardly Ever	856	28.9
Never	1042	35.1
Perceived Benefit		
1) **Awareness of treatments:** DTC advertisements made me aware of treatment that I did not know about		
Strongly Agree	673	22.9
Somewhat Agree	1100	37.5
Somewhat Disagree	383	13.1
Strongly Disagree	777	26.5
2) **Patient-physician relationship:** DTC advertisements helped me to have better discussion s about my health with a health professional		
Strongly Agree	632	21.6
Somewhat Agree	946	32.4
Somewhat Disagree	434	14.9
Strongly Disagree	909	31.1

Table 5. (6)

Descriptive Analyses: Personal Beliefs (continued)

Respondent characteristics	N	%
Perceived Barrier		
1) **Unbalanced Information**: DTC advertisements did not provide information on risks and benefits in a balanced manner		
Strongly Agree	520	18.0
Somewhat Agree	780	27.1
Somewhat Disagree	677	23.5
Strongly Disagree	906	31.4
2) **Physician's Authority**: DTC advertisements made me less confident in my doctor's judgment		
Strongly Agree	139	4.8
Somewhat Agree	317	11.0
Somewhat Disagree	608	21.1
Strongly Disagree	1823	63.1
Perceived Severity		
Overall Health Overall, how would you describe your health excellent, very good, good, fair or poor?		
Excellent	662	22.2
Very good	959	32.1
Good	888	29.7
Fair	354	11.9
Poor	124	4.2

Table 6.

Summary of Dependent Variables and Intervention

Variable of Interest	N	%
Outcome (1): Has an ad for a prescription drug ever prompted you to talk to a doctor about a prescription drug for yourself? *		
Yes	801	26.9
No	2177	73.1
Outcome (2): Has an ad for a prescription drug ever prompted you to talk to a doctor about a medical condition, illness, or other health concern of your own that you had not discussed with a doctor before? *	486	16.3
Yes	2489	83.7
No		
Outcome (3): Has an ad for a prescription drug ever prompted you to talk to a doctor about a possible change in treatment for a medical condition or illness that you already had? *		
Yes	518	17.4
No	2455	82.6
Intervention: Have you ever seen or heard an advertisement for a prescription drugs in the past 12 months?		
Yes	2563	85.8
No	424	14.2

* Only those who have ever seen or heard an advertisement for a prescription drugs in the past 12 months were asked about their physician visit. Those who had not seen or heard an advertisement were coded as ‘no’.

Table 7.

Multicollinearity Tests

Independent Variables	Collinearity Statistics*	
	Tolerance	VIF
Race	.913	1.095
Age	.673	1.485
Education	.707	1.414
Income	.644	1.552
Marital status	.848	1.179
Prescription drugs coverage?	.943	1.061
Healthcare service utilization	.769	1.300
Medication usage	.623	1.605
Diabetes	.868	1.152
Depression	.673	1.486
Arthritis	.505	1.979
Allergies	.385	2.600
High cholesterol	.491	2.039
Asthma or other problems with your lungs	.691	1.447
Anxiety	.703	1.423
Advertisement information utilization	.701	1.427
Advertisement attentiveness	.159	6.279
Perceive benefit: aware of treatments	.602	1.662
Perceive benefit: better discussions with professional	.586	1.707
Information source importance	.882	1.134
Source utilization: TV or radio, not including ads	.721	1.387
Source utilization: Internet websites	.819	1.221
Source utilization: Newspapers or magazines, not including ads	.736	1.358
Source utilization: Family and friends	.848	1.179
Source utilization: A pharmacist	.802	1.247
Source utilization: Pamphlets in a doctor's office/ waiting room	.767	1.304
Source utilization: A doctor	.730	1.371
Perceived barrier: unbalanced information	.872	1.147
Perceived barrier: less confident in my doctor's judgment	.853	1.173
Perceived severity: overall health	.752	1.331

Table 8.

Bivariate Analyses: Pearson Chi-square Tests

Independent variables	Visit for prescription drug	Visit for new condition	Visit for treatment change
Demographics factors			
Sex	***	**	***
Race	*	ns	**
Age	**	*	***
Marital status	ns	ns	ns
Socioeconomic factors			
Education	***	**	*
Income	*	ns	ns
Prescription drug coverage	**	ns	*
Health status factor			
Health service utilization	***	***	***
Regularly take medication	***	***	***
Disease condition: Diabetes	**	ns	***
Disease condition: Depression	***	***	***
Disease condition: Arthritis	***	***	***
Disease condition: Allergies	***	***	***
Disease condition: High cholesterol	***	***	***
Disease condition: Asthma	***	**	***
Disease condition: Anxiety	***	***	***

Note: Significance level *** < 0.0001 ** < 0.05 * < 0.25
"ns" means no relationship between the independent variable and the dependent variable.

Independent variables (Continued)	Visit for prescription drug	Visit for new condition	Visit for treatment change
Market factors			
Advertisement information utilization	***	***	***
Advertisement attentiveness	***	***	***
Personal beliefs			
Referent source	***	***	***
Source utilization: Television or radio	***	***	***
Source utilization: Internet websites	***	***	***
Source utilization: Magazines or newspaper	***	***	***
Source utilization: Family and friends	***	***	***
Source utilization: A pharmacist	***	***	***
Source utilization: Pamphlets	***	***	***
Source utilization: A doctor	***	***	***
Awareness of treatments	***	***	***
Patient-physician communication	***	***	***
Unbalanced information	***	***	***
Physician's authority	***	***	***
Perceived severity: overall health	***	***	***

Note: significance level *** < 0.001 ** < 0.05 * < 0.25

Table 9.

Logistic Regression Model (1): Factors Associated with Visiting a Physician to Discuss a Prescription Drug Prompted by DTC Advertisements

Variables in Model	Odds Ratio	95% CI		Sig.
		Lower	Upper	
Health Status Factors				
1) Whether taking any medication on regular basis?	1.61	1.25	2.08	0.000
2) Disease conditions:				
Depression	1.64	1.10	2.44	0.016
Anxiety	1.57	1.05	2.33	0.028
Market Factors				
Advertisement attentiveness:				0.000
Very high	1.69	1.20	2.37	0.003
High	1.68	1.26	2.25	0.000
Low	.086	0.50	1.49	0.598
Very low (reference group)	1.00			
Personal Beliefs				
-- Subjective Norm:				
1) Source utilization: get health information from a doctor				0.009
Often	1.99	1.19	3.32	0.009
Sometimes	1.58	0.96	2.59	0.71
Hardly Ever	1.20	0.71	2.05	0.50
Never (reference group)	1.00			
2) Source utilization: get health information from a pharmacist				0.024
Often	1.63	1.11	2.41	0.014
Sometimes	1.57	1.14	2.15	0.006
Hardly Ever	1.29	0.94	1.76	0.111
Never (reference group)	1.00			

3) Referent Source: media as most important source prompting a patient to talk with doctor	10.87	7.35	16.08	0.000
-- Perceived Benefit:				
1) Awareness of treatments: Rx ads made me aware of treatment that I did not know				0.000
Strongly agree	3.05	1.95	4.76	0.000
Somewhat Agree	2.33	1.52	3.56	0.000
Somewhat Disagree	1.52	0.92	2.50	0.101
Strongly disagree (reference group)	1.00			
2) Patient-doctor relationship: Rx ads made me have better discussion with professionals				.000
Strongly agree	7.47	4.77	11.71	.000
Somewhat Agree	5.46	3.54	8.41	.000
Somewhat Disagree	2.24	1.37	3.66	0.001
Strongly disagree (reference group)	1.00			

Table 10.

Logistic Regression Model (2): Factors Associated with Visiting a Physician to Discuss a New Health Condition Prompted by DTC Advertisements

Variables in Model	Odds Ratio	95% CI		Sig.
		Lower	Upper	
Health Status Factors				
Disease conditions:				
Arthritis	1.80	1.35	2.41	0.000
Anxiety	1.95	1.38	2.76	0.000
Personal Beliefs				
-- Subjective Norm:				
1) Source utilization: get health information from family and friends				0.02
Often	1.54	0.99	2.41	0.055
Sometimes	1.08	0.70	1.65	0.734
Hardly Ever	0.91	0.58	1.44	0.697
Never (reference group)	1.00			
2) Source utilization: get health information from a pamphlet in a doctor's office or waiting room				0.000
Often	2.66	1.70	4.16	0.000
Sometimes	1.29	0.86	1.95	0.219
Hardly Ever	1.25	0.81	1.91	0.316
Never (reference group)	1.00			
3) Referent Source: media as most important source prompting a patient to talk with doctor	4.78	3.53	6.49	.000
-- Perceived Benefit:				
1) Awareness of treatments: Rx ads made me aware of treatment that I did not know				0.000
Strongly agree	3.28	1.88	5.70	0.000
Somewhat Agree	2.57	1.49	4.42	0.001
Somewhat Disagree	1.54	0.82	2.91	0.184
Strongly disagree (reference group)	1.00			

2) Patient-doctor relationship: Rx ads made me have better discussion with professionals				
				0.000
Strongly agree	5.13	3.00	8.79	0.000
Somewhat Agree	4.17	2.46	7.06	0.000
Somewhat Disagree	2.29	1.26	4.18	0.007
Strongly disagree (reference group)	1.00			
-- Perceived Barrier:				
Unbalanced information: Rx ads did not provide information on risks and benefits in a balanced manner				0.037
Strongly agree	0.81	0.54	1.22	0.312
Somewhat Agree	0.97	0.68	1.38	0.866
Somewhat Disagree	1.36	0.96	1.93	0.089
Strongly disagree (reference group)	1.00			

Table 11.

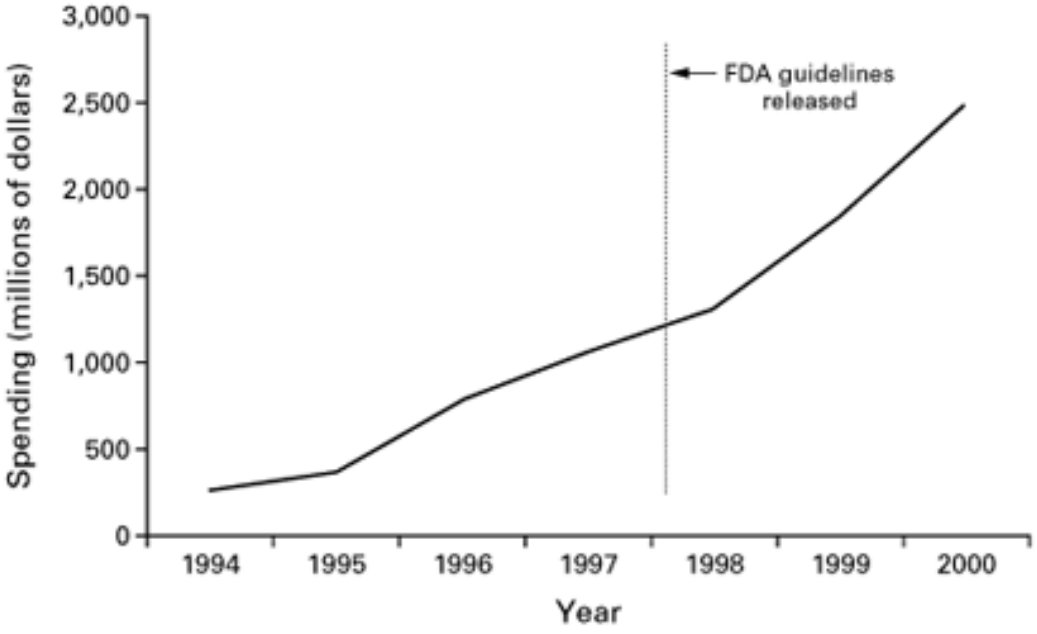
Logistic Regression Model (3): Factors Associated with Visiting a Physician to Discuss a Change to New Treatment Prompted by DTC Advertisements

Variables in Model	Odds Ratio	95% CI		Sig.
		Lower	Upper	
Health Status Factors				
Whether taking any medication on regular basis?	2.11	1.58	2.83	0.000
Disease condition: anxiety	1.73	1.21	2.48	0.003
Demographic Factors				
Race				0.002
White	1.63	0.99	2.68	0.057
Black	2.79	1.53	5.10	0.001
Other races (reference group)	1.00			
Market Factors				
Advertisement attentiveness:				.000
Very high	3.49	2.42	5.04	0.000
High	2.38	1.69	3.35	0.000
Low	2.63	1.50	4.61	0.001
Very low (reference group)	1.00			
Personal Beliefs				
-- Subjective Norm:				
1) Source utilization: get health information from Internet websites				0.037
Often	1.71	1.15	2.54	0.008
Sometimes	1.15	0.82	1.61	0.422
Hardly Ever	0.94	0.66	1.34	0.724
Never (reference group)	1.00			
2) Source utilization: get health information from a pharmacist				0.010
Often	1.82	1.21	2.73	0.004
Sometimes	1.42	1.01	2.01	0.044
Hardly Ever	1.06	0.75	1.51	0.737
Never (reference group)	1.00			

3) Referent Source: media as most important incentive source to talk with doctors	4.87	3.53	6.72	0.000
-- Perceived Benefit:				
1) Awareness of treatments: Rx ads made me aware of treatment that I did not know				0.001
Strongly agree	2.43	1.47	4.02	0.001
Somewhat Agree	1.72	1.06	2.80	0.029
Somewhat Disagree	1.30	0.74	2.29	0.366
Strongly disagree (reference group)	1.00			
2) Patient-doctor relationship: Rx ads made me have better discussion with professionals				0.000
Strongly agree	6.66	3.89	11.41	0.000
Somewhat Agree	5.01	2.96	8.49	0.000
Somewhat Disagree	2.97	1.65	5.33	0.000
Strongly disagree (reference group)	1.00			
-- Perceived Barrier:				
Unbalanced information: Rx ads made me less confident in my doctor's judgment				0.034
Strongly agree	1.08	0.63	1.84	0.784
Somewhat Agree	1.66	1.15	2.39	0.007
Somewhat Disagree	1.35	0.99	1.82	0.056
Strongly disagree (reference group)	1.00			

Figure 1.

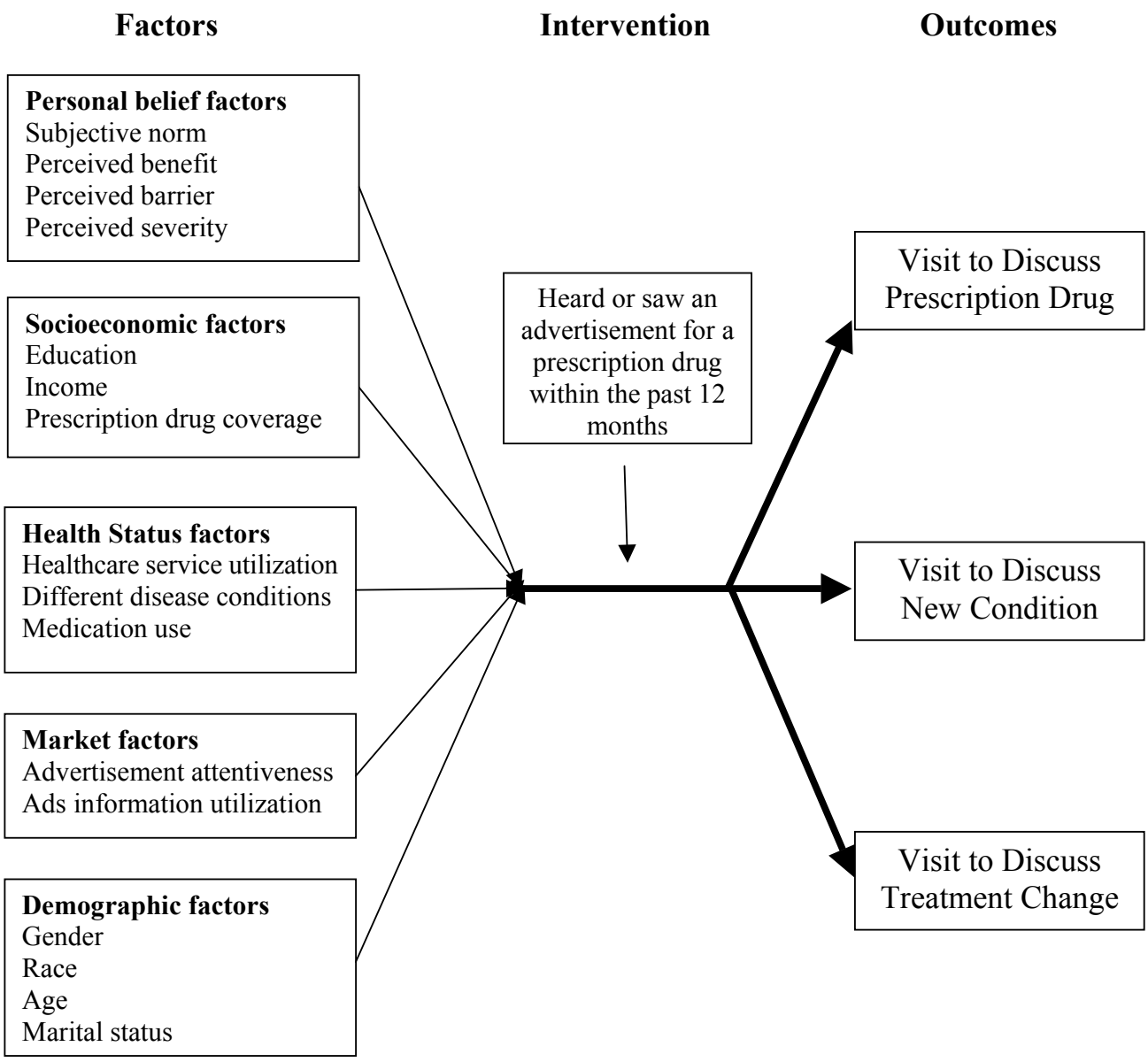
Trends in Spending on Direct-to-Consumer Advertising



Source: Rosenthal et al., N Engl J Med Feb. 14, 2002, 346 (7): 498-505

Figure 2.

Conceptual Framework



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SPSS Syntax for model (1):

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/CONTRAST (adattent)=Indicator(1)  /CONTRAST (q411b1)=Indicator  /CONTRAST
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/CONTRAST
  (q265a4)=Indicator  /CONTRAST (q265a5)=Indicator  /CONTRAST
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  (q411b4)=Indicator  /CONTRAST (q214)=Indicator
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SPSS Syntax for model (2):

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  q265a1 q265a2 q265a4 q265a5 q265a6 q265a7 q265a8 q411b2 q411b4 q214
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/CONTRAST
  (q265a4)=Indicator  /CONTRAST (q265a5)=Indicator  /CONTRAST
  (q265a6)=Indicator  /CONTRAST (q265a7)=Indicator  /CONTRAST
  (q265a8)=Indicator  /CONTRAST (q411b2)=Indicator  /CONTRAST
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SPSS Syntax for model (3):

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(adattent)=Indicator(1)  /CONTRAST (q411b1)=Indicator  /CONTRAST   (q411b5)=Indicator
/CONTRAST (q265a1)=Indicator  /CONTRAST (q265a2)=Indicator  /CONTRAST
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    /CLASSPLOT
  /PRINT=GOODFIT SUMMARY CI(95)
  /CRITERIA PIN(.05) POUT(.10) ITERATE(20) CUT(.5) .
```

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2. H. Xin, H. Chen, H.M, Luo, The Development Trend of State-owned Pharmaceutical Wholesalers, China Pharmaceuticals, Vol. 7 (10), Oct. 1999

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