

Does Direct to Consumer Advertising of Antidepressants Affect Visits to Physicians?

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Abstract:

The US is one of only two countries in which Direct-to-consumer (DTC) advertising is currently permitted. There are ongoing calls in Congress to ban the practice, because of concerns that it may lead to the inappropriate diagnosis and treatment of diseases, and to higher prices for medicines. In this paper, we study the influence of print DTCA for antidepressants by studying how they affect the decision to seek physician care. We add to the literature because prior work in this area has only been able to link market level (or national) advertising to individual level physician visits, whereas our exposure comes from individual measures of advertising exposure. Our main data set is the Simmons National Consumer Survey (NCS), a nationally representative cross-sectional survey covering 2003-2007. I create my independent variable by linking reports in the NCS and magazine reading habits with data from other databases that tells me what ads appeared in those shows or magazines. NCS asks how often the respondent read a specific magazine. Respondents reported how many issues of each magazine they read of the past four issues; I extrapolate for the entire year from this, assuming that the reading pattern of the last 4 issues is indicative of behavior during that past year. Data on DTC print advertisements were taken from a database created at Cornell University containing a digital representation of every pharmaceutical advertisement that appeared between the time period in 26 of the top read consumer magazines in the United States, which in turn represents approximately 60% of readership data in the NCS. Among the 105,299 respondents to the NCS on whom I have data, the average exposure to antidepressant print ads is 5.43 advertisements. I examine the causal effect exposure to antidepressant advertisements number on the likelihood of visiting a healthcare practitioner (general/family practitioners, nurse practitioners, and internist) in the last 12 months in the NCS. I estimate a falsification test using a dependent variable that should not be affected by antidepressant ads, visits to podiatrists. The richness of the data allows me to specify a model in which the variation in ad exposure used to estimate the key parameters are orthogonal to unobservables about the individual that may be correlated with both ad exposure and with care seeking behavior, controlling for factors used by marketers in targeting ads.

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Introduction

Direct-to-consumer (DTC) advertising is currently permitted in only two countries, the United States and New Zealand. Recently Canada and the European Union have debated whether to implement a system similar to that of the United States (Calfee 2002). There are several reasons why there are few countries that actually allow DTC advertising. Two of the primary reasons for the opposition is that DTC advertising may drive unnecessary physician visits and may fuel unnecessary demand for expensive prescription drugs.

Within the past few months several members of Congress have requested a ban on DTC advertising. Their concern rests on how the ads impact care seeking behavior. Individuals tend to prefer to solve their health problems by taking a prescription drug because it is easier than changing their lifestyle behaviors (Calfee 2007). Specifically, Representative Henry A. Waxman, (D-CA), declared that he wanted to empower the FDA to prevent consumer advertising for newly approved prescription drugs. This temporary ban would remain in effect until such time as the FDA has time to approve each ad for a specific newly approved drug and the actual medical experiences related to the drug can be documented. Representative Jerrold Nadler (D-NY) is quoted as stating “You should not be diagnosed by a pitchman on TV who doesn’t know you whatsoever (Singer 2009).” Such actions by congressional members are in reaction to the belief that DTC advertisements may have a negative impact on the general public, convincing consumers they may have illnesses they possibly do not have or to request drugs they may not need.

Objective of the Study

This study contributes to the research on DTC advertising by presenting to the best of my knowledge the first empirical evidence using individual-level data on how DTC advertising affects the likelihood of physician visits. The vast majority of studies that have investigated this subject in the past have linked national or individual usage of a particular pharmaceutical product with national spending for DTC advertising see Avery 2009 for a review of this literature. This study is novel in that it will use measures at the individual level for both visits to a healthcare practitioner as well as DTC advertising exposure measures. The market drug under study is antidepressants. This is an important market because depression is one of the most underreported diseases. Determining the effects of DTC advertising would be particularly valuable for this market as a result. Prior work in this area by Iizuka and Jin (2005) suggests that increased exposure to DTC advertisements for antidepressants enhanced the likelihood that an individual visited a healthcare practitioner. The study provides evidence of a correlation between DTC ad exposure at the individual level and an individual's physician visits. Another study described below reported 35% of physician visits may have been initiated by DTC advertising (Weisman, Blumenthal, Silk, Zapert et al. 2003). One would assume DTC ads would increase sales since the purpose of advertising is to stimulate demand in a market. However, markets for pharmaceutical drugs operate differently. In this market, demand is regulated by a physician. Accounting for this discrepancy, some of the literature referenced below notes that doctors are willing to prescribe pharmaceuticals by succumbing to the demands of patients (Weisman 2004, Kravitz, Epstein et al. 2005, Kravitz, Epstein et al. 2007). Therefore based on previous studies one would hypothesize that DTC advertising for antidepressants would increase the likelihood of an individual of going to a healthcare practitioner.

An ideal dataset to study this question would contain several key elements. It would track all DTC antidepressant advertisement an individual is exposed to in all media, randomize the exposure, track physician visits for the purpose of diagnosis/treatment of depression, and track scripts issued for antidepressant medications for the individual. With this data one could link exposure to DTC antidepressant advertisements to both physician visits and prescriptions. Though the data used in this study is not ideal, it does contain many of the key elements listed above.

In the next section of the paper, I review past literature on the subjects of depression; present information will be presented on what types of people consult physicians, the effects of DTC advertising on product use, and the relationship between DTC advertising, the consumer and their healthcare practitioner. Methods used to examine this issue will be described, and thereafter empirical results will be reviewed. Finally, I will describe several implications of my results as well as future research that I may want to investigate.

Literature Review

Prevalence and Treatment of Depression:

Approximately 14.8 million Americans, 6.7 percent, of the U.S. population 18 or older, have major depressive disorders in a given year according to the National Institute of Mental Health (2008). Moreover; depression is currently the leading cause of disability in the United States (Cross 2004). The World Health Organization (2001) reports that close to 20% of patients who are examined by health care professionals suffer from at least one mental disorder. Likewise the report states that one in four families is likely to have at least one member with a behavioral or mental disorder. Finally, the report projects that based on current trends, by the year 2020 depression will be the second leading cause of disability adjusted life-years (DALYs).

It appears that depression imposes a significant cost on society from a business perspective. Depression results in more absenteeism by employees than any other physical disorder. It is estimated that the cost to employers located in the United States is more than \$51 billion per year in lost productivity (Cross 2004). Likewise nearly 225 million workdays are lost annually in the U.S. due to major depressive disorder (Kessler et al. 2006). More than half of all individuals who stated they were suffering from mild depressive symptoms also reported they had some difficulty in daily functioning due to their symptoms. These individuals reported it was difficult for them to “work, get things done at home, or get along with other people” (Pratt, and Brody 2008). Finally, one study postulates that employees with depression have an unemployment rate that is approximately five times higher than those without depression. This also leads to lower hourly earnings for those who are depressed after they find a new job (Lerner et al. 2004).

Compared to women, men are almost half as likely to be diagnosed with a depressive disorder after age 15 (National Institute of Mental Health 2006). Approximately 20 percent of

women will be treated for depression in any given year, and one quarter of all women will experience an episode of depression in their lifetime (Linsenmayer et al. 1999). Depression is also considered the most common mental disorder for individuals 65 or older (American Psychiatric 2007). Not only do depression rates differ by gender and age, they differ by race and socioeconomic status. Low income individuals, uneducated individuals, and unemployed individuals tend to be more depressed than their counterparts. Married women are reported to have higher rates of depression than unmarried women. This is not true for men, as it appears that unmarried men are more likely to be depressed than their married counterparts. Finally as the number of children in the household increases, the risk of depression increases for women (McGrath et al. 1990).

Olfson and Marcus (2009) found that in 1996 only 6 percent of the United States, 13 million people, used an antidepressant medication. That number more than doubled to 27 million by 2005. In addition the authors determined that outpatient treatment for depression rose steadily between 1987 and 2007. The rate increased from .73 per 100 persons to 2.33, a finding consistent across socioeconomic and demographic groups. Moreover, individuals that were divorced, separated or widowed had the highest rates of outpatient treatment for depression. Likewise the authors found that in 2005, antidepressants surpassed antihypertensive agents as the most prescribed class of medication in office-based and hospital-based medical practices. The rate of antidepressant treatment increased for males and females of all ages, marital status, educational achievement, insurance status and employment between 1996 and 2005. While the authors also report significant increases in the mean number of antidepressant prescriptions issued in all socioeconomic demographic groups except youths, young adults, older adults, Hispanics and uninsured persons between 1996 and 2005. Finally there was a significant increase in the

percentage of users treated with antipsychotic medications. According to IMS Health, in 2008 more than 164 million prescriptions were written, equivalent to nearly \$9.6 billion in U.S. sales of the drug (Barbara 2009).

The type of physicians who prescribes antidepressants, and the mean number of antidepressant prescriptions an individual receives is also important to consider. Olfson and Marcus (2009) report that among those prescribed antidepressants in 2005, 34.59 percent were treated by psychiatrists and 7.46 percent were treated by non-psychiatric physicians. Finally, the authors report that only a small minority of patients prescribed antidepressants were treated by a psychiatric counselor or psychologist over the course of a single year, and a lower percentage have undergone psychotherapy (Olfson and Marcus 2009). Overall the number of individuals who have been diagnosed with depression and prescribed a medication for depression has increased substantially over the past decade.

Pros and Cons of DTC Advertising:

Proponents:

In the literature there has been a growing debate surrounding DTC advertising. One argument in support of DTC advertising is that they are used to inform consumers about health conditions and treatments rather than dictate what they do at the doctor's office. Since new healthcare devices and techniques are developed almost daily and consumers rely on various sources of information to keep them informed (Pines 1998). Calfee (2007) notes some potential positive spillover effects generated by DTC advertising. For example, an individual may go to their doctor to discuss their health status after being exposed to an advertisement. As a result of

the advertisement, the doctor may be able to prescribe lifestyle changes for the patient, generally seen as more effective alternatives than pharmaceuticals (Calfee 2007).

Proponents of DTC advertising also have stated that a large number of individuals go undiagnosed for variety of ailments each year and that DTC advertising is a possible way to reach this population and encourage them to seek treatment. According to Holmer (1999), only one depressed individual out of 10 receives the appropriate medical treatment for their ailment. In addition, one third of individuals who have major depression do not make an attempt to receive help. This is due in large part to the fact that drugs treating depression require consumers take the initiative to see a physician or psychiatrist. This set of stakeholders argues that DTC advertising offers the consumer the opportunity to become more active in their own healthcare (Calfee 2002). In his article, Holmer offers the seminal argument in favor of DTC advertising:

“Pharmaceutical companies have both a right and a responsibility to inform people about their products under the supervision of the FDA, which regulates prescription drug advertising. Companies are committed to responsible advertising that enhances the patient-physician relationship and encourages the appropriate use of prescription drugs under a physician’s supervision. While such advertising prompts more people to seek professional help, it does not dictate the outcome of the physician visit or the kind of help patients (Holmer 1999: 381).”

Information provided in DTC advertising is intended to encourage the consumer to have a conversation with a physician about different treatment options best suited to their needs and preferences (Nair 2005).

Some proponents of DTC advertising feel that changes need to be made to the current system in order to maximize the benefits of DTC advertising to society and consumers. Bell and Kravitz (2007) warn that a ban on DTC advertising would be a direct violation of the First Amendment. The authors state that DTC advertising serves society best when “(i) the advertised

condition is serious, (ii) the condition is undertreated in the population, and (iii) the treatment is highly efficacious and safe in comparison to the alternatives.” If DTC advertising is responsibly undertaken, they argue it could make consumers aware of dangerous conditions and the availability of possible treatments. Finally advertisements should specify therapies that don’t involve pharmaceuticals, such as lifestyle changes (Kravitz and Bell 2007).

Opponents:

Those opposed to DTC advertising offer a plethora of arguments on the drawbacks of DTC advertising in society and the multiple costs to social welfare. The American College of Physicians, claim that DTC advertising leaves patients confused and misinformed, undermines the physician/patient relationship and leads to unnecessary spending (Auton 2006). Other vocal opponents include insurers and medical practitioners (Iizuka and Jin 2005). According to Naier (2005), detractors oppose DTC advertising because two of its main goals clash and in opposition with one another. One goal is to provide information to educate consumers, while the other goal is to make a profit. Other opponents have stated that DTC advertising has a business-stealing effect that misleads patients into demanding heavily advertised drugs over cheaper generic alternatives, and to purchase unnecessary medications (Iizuka and Jin 2005).

Physicians offer a variety of perspectives on why DTC advertising should be banned. In a recent survey, physicians reported feeling conflicted when a patient made a request for a specific advertised drug. The physician did not want to alienate the patient but also didn’t want to prescribe the wrong treatment. Other physicians feared that DTC advertising would extend the

myth that there is a “pill for every ill,” amongst all consumers, which potentially could have a negative influence on the consumer’s health in the long run (Findlay 2001).

In summary, the sentiments of both supporters and opponents of DTC advertising are substantially different. Supporters view DTC as meeting the needs of consumers by using DTC advertising. The opposition on the other hand worries how advertising will affect the perceptions of what medicines can do, or express concerns over how it affects their professions.

Regulation of DTCA:

DTC advertising is regulated by the FDA, which serves as a policy watchdog by examining drug advertisements to ensure the advertisement is not deceptive or misleading. In 1997 the FDA instituted several new rules for regulating DTC advertising. One of the more prominent features of the 1997 rule change was that advertisers were required to present a balance of drug benefits and risks, but not required to report all of the side effects of the drug or even the major side effects (Davis 2000).

Particularly for print advertisements, the advertiser was required to provide a “brief summary,” which listed side effects, contradictions and the drug’s effectiveness. In order to comply with this requirement, the print advertiser tended to include the entire risk-related section of their label. However, direct to consumer advertisements on broadcast television succumbed to some different requirements. Broadcast ads had to include either a brief summary or an “adequate provision,” for the dissemination of the drug’s product label which was already approved by the FDA. In 1999 the FDA again changed their rules stating that broadcast DTC would be able to meet the “adequate provision,” by including in their ads a reference for consumers to a physician or pharmacist as well as more information on their product either

available through a Web site, toll-free telephone number or a running DTC print advertisement. Finally ads had to include language that consumers could understand especially when they presented information in the major statement of adverse effects and contradictions described above (Kaphingst and DeJong 2004).

Though the FDA was put in charge of regulating DTC advertising, there are serious drawbacks to the current system. Stange (2007) argues it is time for America to ban DTC advertising since FDA regulations are simply not working. He holds that a ban would improve the public's health and quality of care. To support this perspective, Stange cites several studies. One study, "Creating Demand for Prescription Drugs: A Content Analysis of Television Direct-to-Consumer Advertising," coded content in television ads shown during evening news and prime time hours. The authors coded factual claims made about the target condition, how the ad attempted to appeal to consumers and how the ad portrayed the medication and lifestyle behaviors in the lives of ad characters. Surprisingly, emotional appeals appeared in almost every ad aired. The authors conclude that DTC advertising provided very limited information about the causes of a disease or who is at risk. Rather the ads show characters that lost control over their lives before the use of the medication across drug types. In addition the ads neglected the fact that many of the illnesses could be shaped by lifestyle changes. Finally none of the ads actually reported behavior change as an alternative to use of product (Frosch, Krueger, et al. 2007).

There have been many studies on DTC advertising, the vast majority of which have been done at the aggregate level. In a recent study Block (2007) performed a cost-benefit analysis on anti-depressant DTC advertisings. Costs were generated by multiplying the price of a single antidepressant drug by the estimated number of doctor visits caused by DTC advertising. To determine the number of DTC advertising related visits Block utilized existing literature and

attempted to solve for the proportion of drugs requested by depressed and non-depressed individuals. Benefits on the other hand were determined by looking at how many people are helped by the use of antidepressants from the subsection of individuals who receive them; this was determined to be approximately 6 percent of individuals at most. Likewise Only 6 percent of doctor visits for depression were made by depressed individuals. In addition, Block found that about 13 percent of those treated for depression actually received benefits from the treatment. Though there were relatively few individuals who actually benefited from being exposed to DTC advertisements Block concluded that the benefits of having DTC advertising outweighed the costs. “DTC advertising improves social welfare even if the costs of all the potential physician visits are included.” However public opinion on the subject does not correspond with the findings of the above survey. On the subject of DTC advertising, 9 out of 10 respondents in a recent survey of 2,500 US residents over the age of 18, reported it increased the costs of pharmaceuticals. Likewise three fourths of the sample felt that the costs of DTC advertising outweighed the benefits (Polen et al. 2009).

Regulatory practices for both print DTC advertising and television DTC advertising differ. In addition it appears that the regulations for both have are relatively ineffective at preventing pharmaceutical companies from describing their products accurately. Finally it is important for us to determine how much advertising takes place and whether this necessarily corresponds with an increase in the likelihood of doctor visits.

Consumer Spending on Drugs:

Spending on direct-to-consumer advertising for pharmaceuticals has risen over the past two decades. Between 1996 and 2000 total expenditures spent on DTC advertising increased by 212%. Rosenthal et al reported high levels of spending on drugs used to treat chronic conditions, drugs with a low incidence of side effects and drugs close to approaching the end of their patent protection (Rosenthal et al 2002). Between the years 2000 and 2006, DTC advertising spending has increased and reached its peak in 2006. Since that year spending has declined steadily having fallen from \$5.4 billion at the end of 2006 to \$4.7 billion at the end of 2008 and finally to \$4.2 billion at the end of 2009 according to TNS Media Intelligence. One theory for the decline was the recent economic downturn. A second theory postulated by one expert was, 2009 would not offer any new blockbuster drugs that would help boost total DTC advertising spending (Mack).

Out-of-pocket expenditures for prescription drugs by consumers have decreased. Kaiser reported that the share of prescription drug expenditures paid by private health insurance increased from 26% in 1990 to 44% in 2006. This corresponds with consumers having to spend less for prescription drugs. In sum, out-of-pocket expenditures by individuals fell from 24% in 2005 to 22% in 2006. This decline in out-of-pocket expenditures has been theorized to have increased the probability of individuals filling more prescriptions for medicinal purposes (Kaiser Family Foundation 2008).

With a decline in the amount of out-of-pocket expenditures made by consumers, there has been an increase in the number of prescriptions that consumers purchase. Between 1997 and 2007, the number of prescriptions purchased increased an astounding 72%. This is roughly the equivalent of 1.6 billion prescriptions. Likewise the number of prescriptions per capita also

jumped from 8.9 to 12.6 (Kaiser Family Foundation 2008). According to the 2006 summary of the National Ambulatory Medical Survey, drug therapy was reported for close to 636.7 million doctor visits, approximately 70.6 percent of all visits (Cherry, Burt and Woodwell 2008).

The number of prescriptions issued differs by gender. Sayer and Britt find that females are significantly more likely than males to receive prescriptions for a vast array of ailments even after controlling for morbidity differences. Females were more likely to receive prescriptions for hormones, psychological conditions, nutrition, and urogenital conditions. In addition, the authors found that females requested medicinal care more often than males (Sayer and Britt 1997).

Spending on DTC advertising has increased for most of the past decade. It was not until the past three years, in which spending began to decline steadily. This could most likely be attributed to economic conditions. However, demand for antidepressants has increased steadily as well over the past decade. While DTC advertising has been described as one of the reasons for this trend, another reason is the recent decline in out-of-pocket expenditures for prescription drugs by consumers. Insurance companies and the government are bearing a larger portion of the cost than ever before and consumers may be taking advantage of this by purchasing more prescription drugs.

Patterns in Physician Consultation:

Socio-demographic characteristics

There are very few studies that have looked at determinants of physician visits (consultation rates). Although this is not the focus of my study, my results will contribute to what is known in this area. Campbell and Roland (1996) in their paper have the best accumulation of the literature on the subject. Physician consultation varies significantly by life stage. Children

and the elderly tend to consult the doctor at very high rates, whereas those in life stages in the middle of that spectrum visit physicians at much lower rates. This is because individuals are much more susceptible to chronic diseases during these ages. Women consult doctors more often than men. The difference between the two genders is largest between the ages 16-44 during which females visit a physician almost twice as often as their male counterparts. Three ethnic groups have higher consultation rates than Caucasians: Indians, Pakistanis, and Afro-Caribbeans. Minority ethnic groups (except elderly Afro-Caribbeans) are less likely to consult for mental illness. These discrepancies are argued to exist because there are several barriers that impede minorities from visiting with a doctor (Campbell and Roland 1996).

There are numerous other factors that influence physician consultation. Unemployed individuals are more likely to consult a physician than employed individuals (Campbell and Roland 1996). It has been speculated that unemployed individuals in the past are more susceptible to morbidity and mortality than their employed counterparts. In addition, employed individuals have been reported to recover from illnesses quicker than the unemployed (Dorling 2009). Increases in consultation rates may be attributed to an increase in illness or an inability to cope with symptoms that developed as a result of either psychological stress or problems within the family resulting from the unemployment. Renters were more likely to consult a healthcare practitioner than those who own their home. In addition house ownership was cited as a stronger indicator of consulting with a doctor than social class. If a potential patient had a well developed social network, they were less likely to consult with a doctor. Single and married adults did not consult physicians as often as widowed or divorced adults. Stress also played a key role as to whether or not an individual would consult a doctor (Campbell and Roland 1996).

Psychological characteristics

Campbell and O’Roland argued that there were four key psychological characteristics that determine whether an individual seeks help from a doctor or not: perceived severity, vulnerability to illness, perceived costs of different types of health seeking behavior, and perceived benefits of action. Perceived susceptibility is how healthy an individual believes themselves to be. If the individual has a low perceived susceptibility they are less likely to go to a physician because they perceive themselves to be healthy and less vulnerable to illness. Individuals with high perceived susceptibility believe they are ill and are more vulnerable to illness and therefore more likely to go to a healthcare practitioner. Perceived severity can include how serious the symptom is, how frequent the symptoms occur and finally the probability of the illness becoming more dangerous. Individuals are more likely to attend a general practitioner if they fear that their symptoms are worsening. The perceived benefits and costs from seeking medical care are important to consider as well. The benefits are gauged by how effective the individual feels the treatment will be in comparison to the individual treating themselves. In addition the costs that have to be considered include: prescription charges, transportation costs, lost time from work, access to care, and side effects from medications. Individuals who believe that the benefits of going to a healthcare practitioner outweigh the costs are more likely to consult a healthcare practitioner (Campbell and Roland 1996).

Health Insurance Status

Insurance status has been found to have a significant impact on whether an individual consults a healthcare practitioner. The uninsured are less likely to consult physicians and much

less likely to seek care for life threatening symptoms. Hafner-Eaton (1993) performed a study that determined the link between insurance status and physician consultations for three classes of individuals: chronically ill, acutely ill, and healthy nonelderly. The author found that the uninsured were less likely to attend a physician within the previous 12 months. In addition utilization by the uninsured was influenced by health of the individual. Those who were chronically ill and uninsured or healthy and uninsured were nearly half as likely to consult a physician as individuals who were chronically ill and insured or healthy and insured. The larger disparity between the groups was with the uninsured healthy and insured healthy. However the author proceeds to conclude that more research must be done to determine whether this is a result of individual choice.

To review, it appears as though there are wide arrays of factors that influence the likelihood of an individual to visit a healthcare practitioner. These include but are not limited to gender, race, age, income, marital status, and size of social networks. In addition it appears as though healthcare status and other psychological characteristics play an important role on consultation rates for an individual. I hope to shed some more light on the effects of these characteristics in my paper. But it will also be vital to control for each of these characteristics when determining the effect of DTC print advertising on doctor visits.

Impact of DTC Advertising on Antidepressant Use:

Public opinion on both potential causes and treatments for depression has changed significantly from the early 1990s. In their study Marcus and Blumner (2009) found an increase in beliefs that depression was caused biologically and that pharmaceutical treatments are

available to fight the disease. Other studies have also made similar discoveries on this subject (Mojitabi 2009). Marcus and Blumner (2009) conclude that DTC advertising may be a major cause of why individuals have developed new opinions on the causes and treatments available for depression. It has been speculated that the more antidepressant advertisements an individual were exposed to the more prevalent the individual perceives the advertised disease to be (An 2008). Park and Grow (2008) conducted a study investigating whether or not exposure to print forms of anti-depressant advertising led to inflated perceptions of the prevalence and lifetime risk of depression and found a positive association with a perception of having a lifetime risk of depression (Park and Grow 2008).

There are two potential ways DTC advertising for antidepressants can increase demand for the product: 1) increase the likelihood an individual initiates treatment and 2) increase utilization among individuals already taking antidepressants. Using the Medical Expenditure Panel Survey (MEPS), Meyerhoefer and Zuvekas (2008) attempt to measure how advertising affects an undiagnosed individual's decision to visit a physician for a check-up. The authors conclude that DTCA for antidepressants does increase the likelihood an individual initiate's treatment. Though there is an increase in the likelihood of initiating treatment, this does not necessarily increase utilization for those who are already taking antidepressants. In all, the main premise the authors stress is that the demand curve for individuals is shifted outward and rotated counterclockwise as a result of antidepressant DTC advertising.

In a study to determine the impact of individual-level exposure to DTC advertising on the use of antidepressants, Avery, et al. (2009) found the impact of ad exposure differed by gender. The authors used exposure measures taken at the individual level and determined the likelihood of an individual self diagnosing themselves with depression and use of medications. In addition

the authors utilized both print and media exposure measures to test their hypothesis. They find that females were more likely to identify themselves as being depressed than males. Secondly, they find that DTC advertising exposure increased the probability of self diagnosis of depression for both genders. Finally they find similar significant effect in both print and television DTC ad exposure, although television effects were stronger. This suggests that antidepressant DTC advertising has an influence on individual self diagnoses for depression (Avery et al. 2009). This study uses the same datasets as Avery et al. (2009) to determine the influence of DTC advertising for antidepressants on physician visits.

The impact of DTC advertising on physician visits:

The key relationship that I hope to identify in this study, is to understand the relationship between individual exposure to DTC advertising and the likelihood of a visit to a healthcare practitioners. Most previous studies measure DTC advertising at the *market* level. This study will examine the exogenous effects of DTC advertising exposure at the individual level on the likelihood of visiting a healthcare practitioner.

Compared to other predictors of physician visits, DTC advertising seems to have a relatively large effect. In a study conducted by Weisman, Blumental, Silk, Zapert, et al. (2003) the authors determined that nearly 35 percent of physician visits for their survey sample were due to DTC advertising. The respondents also reported that they spoke to other sources to gauge whether or not a certain health issue was serious enough to consult a physician about. These influences included: friends and family (51%), broadcast media (40%), print media (34%), pamphlets in doctors' office (33%), another doctor (33%), the internet (16%), and pharmacists

(17%). Of those who had been exposed to DTC advertising, nearly half of the respondents stated that they were “highly influenced” by DTC advertising in discussing the medication with their healthcare practitioner. Those who classified themselves in good health seemed to be highly susceptible to DTC advertising and were more likely than others to have a discussion about pharmaceutical treatments than about other health concerns. The authors classified a DTC advertising visit as one in which the individual requested an advertised medication and was prescribed the medication. For almost every individual who had a DTC advertising visit, there was some sort of action taken by the healthcare practitioner.

It is also important to identify whether or not individuals who are exposed to DTC advertising and go to a physician receive a prescription for the medication they are seeking. Kravitz, Epstein et al. (2005) performed a randomized controlled study in which they measured the effects of patients’ DTC advertising requests and their impact on a physicians’ initial treatment decision for depression. Antidepressants were more likely to be prescribed for individuals who displayed major depression compared to other disorders. More importantly, the authors determined that if the patient verbalized a specific request for a particular drug the physician was statistically more likely to prescribe that brand. Overall prescribing was higher among patients who made a request for a particular brand or a general request for a pharmaceutical. The authors investigated whether DTC advertising caused individuals with trivial problems to receive prescribed medications without needing them. They found that this was more often the case when the disorder the patient appeared to suffer from was ambiguous to the doctor.

In a survey of a nationally representative sample of physicians regarding events associated with DTC advertising visits, Weismann et al. (2004) found that physicians prescribed

the requested advertised drug in 39% of visits. Within that sample of physicians, 46% stated that the DTC advertised drug was the most effective. Likewise within the sample of physicians who prescribed the requested drug, 48% stated that alternatives were as effective as the requested medication, but prescribed that medication to meet the patient's request. Over 70% of the respondents stated they felt DTC advertising helped educate patients about possible treatments. 25% of DTC advertising visits eventually resulted in a new diagnosis. Depression was one of the ten most common ailments diagnosed due to a DTC advertising visit. The most common reason for not prescribing the requested pharmaceutical was that there was a cheaper alternative or a more effective drug.

The paper most relevant to the current study was done by Iizuka and Jin (2005). The authors employed TNS Media Intelligence/Competitive Media Reporting (CMR) monthly DTC advertising data from 1995-2000 and the National Ambulatory Medical Care Survey (NAMCS). In the study the authors determined how much DTC advertising influenced individuals to go to the doctor by running a series of linear regressions. The authors eventually conclude that DTC advertisement expenditures are linked with an increased number of doctor visits. When quantified, a \$28 increase in monthly DTC advertising spending corresponds to one patient visit within 12 months. Likewise the authors concluded that the market-expanding effect that they found was consistent across different demographic groups.

A more recent paper on this subject conducted by Hosken and Wendling (2009) examined the effects of DTC advertising on the likelihood of an individual going for a medical check-up. The authors utilized data from TNS and the MEPS. The authors found that drug advertising has a statistically significant positive effect on the likelihood that consumers visited a physician for a check-up. In fact if expenditures for DTC advertising were to increase by 10%,

the authors conclude that this would increase the likelihood of visiting a physician for a check-up by close to 7.5%. The groups that were most responsive to DTC advertising were women and the highly educated. In addition whites and African-Americans were more likely to visit a physician, while there appeared to be no effect on the Hispanic population. Finally insurance status appeared to have no effect on the likelihood of men going for a check-up, but did for women. Though the authors were able to control for individual characteristics and the likelihood of a consultation, they still lack a link to individual exposure measures. In addition the authors also lacked any form of an antitoxin to ensure that their results could be considered valid.

Data

Individual-level Data

To determine exposure to DTC advertisements this study will link reported individual readership behavior to antidepressant and cholesterol advertisements appearing in magazines the individual reports reading in the Simmons National Consumer Survey (NCS). The NCS uses a nationally representative cross-sectional survey design. I will be using data from eight of the waves of the survey spanning mid-2003 to mid- 2007. The NCS data contains demographic characteristics that will be used as control variables in the regressions. The NCS asks respondents several question regarding physician visits. The respondents are asked to check off from a list the type of healthcare professionals they consulted with for any ailments in the last 12 months. Within that sub-sample the respondents were asked about several practitioners of note. Did the respondent go to a general practitioner in the past 12 months; did the respondent go to a nurse practitioner in the past 12 months; did the respondent go to a podiatrist in the past 12 months; and, did the respondent go to an internist in the past 12 months. The survey also asks

how often the respondent reads each of a number of specific magazines. For descriptive statistics for the entire sample of the NCS please refer to Table 1.

DTC Print Ads

Print advertisement data for antidepressants medications was taken from the Ithaca Smoking Cessation Advertisements Database (SCADS). This databank is located at Cornell University in Ithaca, New York. Within the dataset there is a digital representation for every pharmaceutical advertisement that appeared in print between January 1995 and 2009 in 26 of the top read consumer magazines in the United States, which in turn represents approximately 50% of national U.S. readership.

Potential exposure over the past 12 months is measured by merging information on DTC advertisements that appeared in specific issues of the 26 magazines the respondent reported reading. Each respondent in the NCS reported how many issues of each magazine they read on average out of the past four issues. I then calculate a fraction for the number of issues read for each of the respondents and multiply that fraction by the number of DTC advertisements for antidepressants that appeared in that magazine during the past year. Therefore this study assumes that the individual maintains the readership intensity of each of these magazines for the entire year that they did for the previous four issues.

The reader should keep in mind that the data presented here will only be from the 26 most popularly read magazines in the United States. In doing so I would assume that our findings may underestimate actual total exposure if the individual reads more magazines other than those in the SCADS dataset. However I may be overestimating our total exposure since I am unable to

be sure that the individual actually viewed the advertisements in the magazine. Likewise as specified above, I will be using information on what fraction of the last four issues of a magazine the respondent reported reading as a proportion of the advertisements in that issue the respondent was exposed to when all four issues were not read. In addition I would assume that there will be some measurement error in our magazine exposure measure, but I also assume that this will not be correlated with the likelihood of a doctor visit.

Another limitation of our study is that I measure potential, not actual DTC advertising exposure. I am not able to determine whether the respondent actually saw the advertisements in the magazine. I assume then that the exposure measure for print DTC advertising overestimates the actual exposure. However this is a more objective measure of what the total number of advertisements the respondent was exposed to, when compared to other subjective measures used in other studies.

The key questions that I hope to answer in this study are:

Whether the effects of exposure are different for each healthcare practitioner I intend to investigate. The two types are: general practitioner, and an other practitioner (includes both internist and nurse practitioner).

Whether or not the effects of DTC advertising for antidepressants differ by gender. Similar differential effects of DTC advertising have been found in past literature, most notably Avery et al (2009). Likewise females are more likely to visit a healthcare practitioner and more likely to suffer from depression.

Methods

Outcomes:

The goal of this paper is to examine the relationship of DTC print advertisement exposure on the likelihood of visiting a healthcare practitioner. The outcome variables I use are whether the respondent has visited a general/family practitioner in the past 12 months, and whether the individual has gone to some other practitioner. The other practitioner is a combination of both internists and nurse practitioners. The interest of this paper is to look at the effects for different types of healthcare practitioners who could provide a prescription for an antidepressant. In this case both internist and nurse practitioners are able to do so, but they serve as a better comparison to general practitioners after being combined rather than separate. In addition I examine whether or not an individual has gone to a podiatrist in the past 12 months as a reliability test for the print exposure measures. Visits to podiatrists presumably should not be influenced by the number of print antidepressant advertisements an individual is exposed to.

A possible limitation of using these variables for our analysis is that the respondent may have visited a physician for some other reason not related to depression in the last year, and the variable may include doctor visits they went to with a spouse, child or acquaintance due to their illness and that are not specifically related to the respondent's health condition.

Explanatory Variables:

The key explanatory variables are the exposure measures. The antidepressant exposure measures are available between the Spring of 2003 through the Spring of 2007. They will be presented in the following manner. For the entire sample, the exposure measures will be separated into three indicator variables for ease of presentation. The baseline comparison will be individuals that were not exposed to any print exposure in the past year. We will compare this

group using two separate variations of exposure. One defined by exposure to the mean number of ads or less. The second indicator variable will be one represented by individuals who are exposed to more than the mean number of ads. Since this study will examine the effects by gender, these dummies will be presented for the entire sample, the male sample only, and the female sample only. The results for the antidepressant exposure measures will be presented in the following results section. Since the marginal effect of one ad does not necessarily notify me anything specifically about DTC advertising. When compared to grouping the advertisements into dummy variables I will be able to generate a better understanding of what the effect of DTC advertising was on the likelihood of visiting a healthcare practitioner. The assumption that I am making with the dummy is that people who are exposed to zero ads will have different effects than those who were exposed to less than the mean as well as those who were exposed to more than the mean number of advertisements.

I investigated two alternative specification of the exposure measure: first a log linear specification; next a quadratic relationship. This is in order to examine whether the relationship between our variables of interest and dependent variables is linear or some other function form.

Independent Variables

Demographic control variables:

The demographic variables used in the analysis include gender, age, race/ethnicity, education, marital status, family size, employment status, insurance status, region, income, and whether the individual reported suffering from any ailments, all factors that have been found to be related to physicians visits in the literature. The reason why I need to include demographic

variables as controls is to isolate the effects of my key explanatory variable, the exposure measures.

Based on past literature, demographic factors are highly correlated with depressive symptoms. Gender has been listed in the past as a predictor of depression. Females are significantly more likely to suffer from depression, compared to their male counterparts (National Institute of Mental Health 2006). If the individual is of low socio-economic-status they are much more likely to suffer from depression. More than one out of seven poor Americans suffer from depression (Pratt and Brody 2008). Individuals who were unemployed also were more likely to be depressed (Kessler et al. 2003). Married females and single males are more likely to suffer from depression (McGrath et al. 1990). The Centers for Disease Control and Prevention (2009) reported that Non-Hispanic whites were more likely to have been diagnosed with depression than any other ethnic groups. Hispanics are also more likely to suffer from depression when compared to African-Americans. Finally it appears as though the likelihood of depression decreases as the age of the individual increases (Blazer et al. 1994).

Controls for health conditions:

In this study the control for health condition was generated by creating a dummy variable for whether the respondent of the survey suffered from any type of ailment. One limitation of this model is that my indicator for health status will be presents in both my dependent variable as well as an independent variable. Therefore the effect for this particular indicator will be endogenous within the model. As a result models have been run that both include this control and without this control separately. I would expect that there should be some more variation explained in the model controlling for health conditions as opposed to the model that does not

control for health conditions of the respondent. But regardless the any ailment variable should have a positive effect in that if an individual suffers from some ailment, they are more likely to visit a healthcare practitioner.

Controls for readership intensity:

In this study I control for readership intensity, by generating a variable for the total number of magazines that the individual reported reading over the past year. Therefore I summed the number of issues read across magazines to come up with a continuous variable for readership intensity. This variable is an imperfect indicator of readership, because it only uses a subsample of the number of issues that the respondent reported reading and extrapolates it over the past year. However it is necessary to include this indicator in my model because it explains some variation in my dependent variable. More importantly it allows me to look at the variation between two individuals who looked at the same number of issues of magazines last year but different magazines and therefore a different number of advertisements. I would expect however that as the number of magazines the respondent looked at over the past year increases, the likelihood of an individual visiting a healthcare practitioner will also increase.

Fixed effects for magazines read:

The magazine fixed effects were generated, by creating dummy variables for whether the respondent looked at each of the magazines within our SCADS database over the past number of issues. Therefore dummy variables were created for each of the magazines specified in the dataset. If the individual read one of the past 4 issues then they were given a value of “1” for that particular magazine and “0” otherwise. In addition I ran a with magazine category fixed effects and without the magazine fixed effects. Here I would expect that more variation would be

explained by looking at the magazine fixed effects as opposed to the magazine category fixed effects. It may be beneficial to look at the magazine category fixed effects model because some of the advertisers are targeting by using specific types of magazines and not just the magazine itself. The magazine fixed effect model is a stronger model, but it will be nice to look at the magazine fixed effects model as well as another indicator for targeting.

Empirical Model

The model I investigate is:

$$\text{Prob}(V_i) = \alpha + \beta P_i + \delta F_i + \varphi RI_i + \mu W_i + \varphi_2 ME + \varepsilon_i$$

V_i = a indicator variable for whether the respondent went to: 1 = general practitioner; 2 = nurse practitioner or internist; 3 = podiatrist

P = vector of print advertising exposure measures

F = vector of demographic variables

RI = number of issues read of all magazines in the past year

W = NCS wave dummies

P = vector of print advertising exposure measures

ME = Magazine fixed effects

ε = idiosyncratic error term.

This model contains the strongest controls for targeting that I have available. The intention of this model is to observe the effects of the exposure measures while including controls for the readership of specific magazines. I hope to determine whether the same individuals who read the same number of issues of magazines but read different magazines or different issues of the same magazine will reveal effects of antidepressant advertisements. The variation in this model derives from which magazines the individual reads and the number of advertisements within those specific magazines. With this model we expect to find our clearest indication of the true effects of antidepressant advertisements on the likelihood of an individual visiting a healthcare practitioner.

Model Estimation

I estimated the model using OLS, probit and logit algorithms. In the results section I will present the marginal effects for the probit models that are easier for the reader to interpret than logit estimates. In one of the research questions I explore the effects of exposure to DTC advertising by gender. I run each of my models using specifications for the entire sample, the male sample only, and the female sample only.

Reliability Tests

I ran one reliability tests for my exposure measures. The test determines whether or not the antidepressant advertisements have an effect on the likelihood of visiting a healthcare practitioner not associated with depression, a podiatrist.

Results

First, I present some descriptive statistics of the sample, I then present the results from the regression model that I ran and then I discuss my regression results. Descriptive statistics in table 1 show, that men are less likely to visit healthcare practitioners than females¹. In addition we can see that the amount of antidepressant advertisements that males are exposed to during the past year tends to be less than females'. Whereas almost 50 percent of males are not exposed to any forms of magazine antidepressant advertisements only 30 percent of females are exposed to no antidepressant advertisements. This makes sense in that females in my sample also read approximately one more magazine than their male counterparts on average.

Table 1. Descriptive Statistics on Full Sample (N=95,417)

Sample Characteristics	Number /Mean	Percent/Std. Dev.
<i>Demographic Characteristics:</i>		
Gender:		
Male	42,244	44.27
Female	53,173	55.73
Age:		
18- 24	9,312	9.76
25-34	14,241	14.93
35-44	18,617	19.51
45-54	19,241	20.17
55+	34,006	35.64
Race:		
White	57,878	60.66
Black	5,392	5.65
Hispanic	29,198	30.60
Asian	2,104	2.21
Other	1,208	1.27
Education:		
< HS	16,339	17.19
HS Grad	27,583	28.91
Some College	19,846	20.80
College Grad	27,705	29.04

¹ For a more extensive version of table 2 with descriptive statistics of the NCS please refer to table 1 in the back of the paper.

Sample Characteristics	Number /Mean	Percent/Std. Dev.
Health Insurance:		
No	24,706	25.89
Yes	70,711	74.11
Number in household:	3.563	1.900
Employment:		
Not Employed	35,752	37.47
Employed	59,665	62.53
Marital status:		
Single	12,105	12.69
Married	67,392	70.63
Separated	1,417	1.49
Divorced	7,780	8.15
Widowed	6,070	6.36
Region:		
North	6,530	19.30
South	34,956	36.63
Midwest	21,335	22.36
West	20,091	21.06
Home Ownership:		
Rent	24,337	25.51
Own	71,080	74.49
Self reported suffering from depression	7,419	7.78
Respondent suffers from some form of ailment	63,443	66.49
<u>Readership Characteristics:</u>		
Number of Issues Read	4.810	5.523

Table 1 describes the NCS sample used in this analysis. In it approximately 56% of the sample is represented by females. A large proportion of the sample is represented by individuals who are 55 or older (35%). Close to 61% of the sample is represented by males, while African-Americans represent close to 6% of the sample. Hispanics represent a large proportion (30%) of the sample. The distribution of education for the respondents of the survey indicated that 17% of respondents had less than a high school diploma, 29% are high school graduates, 21% had some college education, and 29% were college graduates.. Approximately 74% of sample respondents has some form of health insurance. The average number of individuals living in the respondent's household is close to 3.5. The vast majority of the sample, close to 63%, is employed. Likewise

the majority of the sample is married (71%). Also of interest for this study is that close to 5% of the sample have been treated for depression in the past 12 months. Approximately 8% of the sample suffers from depression, whereas close to two thirds of the sample suffer from some ailment reported in the NCS survey. Finally, the mean number of magazine issues that respondents reported reading was close to 4.81 issues in the last year.

Table 2. Descriptive Statistics: Dependent variables and exposure measures

	Full Sample (N=95,417)		Male Sample (N=42,244)		Female Sample (N=53,173)	
	Number	Percent	Number	Percent	Number	Percent
<u>Dependent Variables:</u>						
Visit to general practitioner	35,733	37.45	14,631	34.63	21,102	39.69
Visit to practitioner	11,407	11.95	3,926	9.29	7,481	14.07
Visit to a podiatrist	3,712	3.89	1,265	2.99	2,447	4.60
<u>Exposure Measures:</u>						
No exposure to DTC antidepressant ads	36,876	38.65	21,652	51.25	15,224	28.63
Exposure to < mean number of DTC antidepressant ads	31,573	33.09	9,928	23.50	21,374	40.20
Exposure to = or > mean number DTC antidepressant ads	26,968	28.26	10,664	25.24	16,575	31.17

Table 2 provides some descriptive statistics on my key independent variables, the exposure measures, as well as my dependent variables. In terms of the dependent variables, females had higher rates of visiting each of the practitioners at least once during the past 12 months. This is consistent with what would be expected from past literature, in that females are more likely to visit a healthcare practitioner. A little more than a third of the sample visited a general practitioner in the past 12 months. While close to 12% of the sample visited either an internist or a nurse practitioner in the past 12 months, a very small percentage of the sample visited the practitioner used for the reliability test, the podiatrist. A higher percent of families

reported visiting a doctor (40% general practitioner; 14% practitioner; 5% podiatrist)) than males (35% general practitioner; 9% practitioner; 3% podiatrist) in the sample,

Approximately 39% of the sample was not exposed to an antidepressant advertisement in the past 12 months, while 61% were. Females in the sample (51%) were twice as likely to be exposed to antidepressant advertisements as their male counterparts (29%). Less than half of the male sample was exposed to a single DTC advertisement for antidepressants. In comparison, more than half of the female sample was exposed to at least one antidepressant advertisement. This could be due to targeting of the female population by the pharmaceutical companies because females are more likely to be depressed, or because females the NCS sample read one more magazine issue per month on average than their male counterparts.

Table 3A. Probit results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – General practitioner.

Independent Variables ¹	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value
Less than mean exposure	0.061	4.563	0.000	0.002	0.106	0.916	0.080	4.252	0.000
More than mean exposure	0.062	3.322	0.001	-0.006	-0.229	0.819	0.066	2.508	0.012

¹ Omitted category: No exposure

Table 3A provides the results to test the first research question, i.e., whether exposure to DTC antidepressant advertising increased the likelihood of visiting a specific type of healthcare practitioner. Table 3A provides the coefficients for the main exposure effects only. Full regression results are provided in Appendix Table 13A. The model was estimated using a probit algorithm on the entire NCS sample, the male sample only, and the female sample only. Results

indicate that the likelihood of visiting a general practitioner for the entire NCS sample increases by 6.1% if the respondent was exposed to less than the mean exposure, when compared to an individual who did not view any DTC advertisements for antidepressants. Likewise this percentage goes up slightly for individuals who are exposed to greater than the mean number of advertisements (6.2%). I conclude from these results that there is evidence to support the hypothesis that, controlling for targeting, exposure to DTC antidepressant advertising does have a modest impact on general practitioner visits. The data indicates no significant effects of exposure to DTC advertisements for the male sample on the likelihood of visiting a general practitioner. On the other hand females who are exposed to less than the mean number of ads are significantly more likely (8%) to visit a general practitioner. Even more surprising is that the magnitude of this effect is smaller (6.6%) if the female respondent is exposed to more than the mean number of DTC advertisements. It appears as though the effects of DTC advertising on the likelihood of visiting a general practitioner are indeed differentiated by gender.

Table 3B. Probit results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – Practitioner.

Independent Variables ¹	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P - value	Coeff.	T-STAT	P - value	Coeff.	T-STAT	P - value
Less than mean exposure	0.032	1.817	0.069	0.019	0.654	0.513	0.043	1.772	0.076
More than mean	0.025	1.049	0.294	0.078	2.115	0.034	0.048	1.465	0.143

exposure									
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¹ Omitted category: No exposure

Table 3B provides the results to test the first research question, i.e., whether exposure to DTC antidepressant advertising increased the likelihood of visiting a practitioner (combination of internist and nurse practitioner). Table 3B provides the coefficients for the main exposure effects only. The model was estimated using a probit algorithm on the entire NCS sample, the male sample only, and the female sample only. Results indicate that the likelihood of visiting a practitioner for the entire NCS sample increases by 3.2% if the respondent was exposed to less than the mean exposure, when compared to an individual who did not view any DTC advertisements for antidepressants. However the effect of being exposed to more than the mean level of exposure was not significant. I can conclude from these results that there is evidence to support the hypothesis that, controlling for targeting, exposure to DTC antidepressant advertising does have a modest impact on practitioner visits if the exposure is less than the mean. Higher levels of exposure do not appear to have any effect on practitioner visits. The data indicates a significant effect of exposure to DTC advertisements for the male sample on the likelihood of visiting a practitioner for the greater than the mean level of exposure (no effects were found for low DTC ad exposure). On the other hand, females who are exposed to less than the mean number of ads are significantly more likely (4.3%) to visit a practitioner. This result was only significant at the 10% level. It appears as though the effects of DTC advertising on the likelihood of visiting a practitioner are indeed differentiated by gender. The magnitude of the likelihood of visiting a practitioner appears to be different for both the male and female sample. The likelihood for males greatly increases after they are exposed to more than the mean number of advertisements (1.9% to 7.8%). Whereas the size of the effects of DTC exposure in the female

sample were the same for both low (4.3%) and high (4.8%) exposure, only low exposure was moderately significant in the female sample.

Table 3C. Probit anti-test results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – Podiatrist.

Independent Variables ¹	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P - value	Coeff.	T-STAT	P - value	Coeff.	T-STAT	P - value
Less than mean exposure	-0.025	-1.02	0.308	0.023	0.565	0.572	-0.042	-1.248	0.212
More than mean exposure	-0.044	-1.31	0.190	-0.024	-0.455	0.649	-0.05	-1.104	0.269

¹ Omitted category: No exposure

Table 3C provides the results of the reliability test, i.e., whether exposure to DTC antidepressant advertising increased the likelihood of visiting a podiatrist, a medical practitioner unrelated to the diagnosis and treatment of depression. The results for all of my reliability regressions appear not to be significant. I conclude from these results that the exposure measures are operating correctly and have some validity in correctly predicting appropriate physician visits.

Sensitivity Analysis

Two alternative models were estimated to test the sensitivity of study results to alternative specifications of the exposure measure. These results are reported in Appendix Tables A3A-1 through A#A-3, and A#B-1 through A3B-3. In the main model a set of dummy variables

was used to capture exposure effects. The use of dummy variables for no, low, and high exposure allows the relationship between exposure and the probability of a doctor visit to be parsed out at different intervals, and how it compares to not being exposed to any advertisements over the past year. Here I was assuming that the difference between being exposed to one or two advertisements may be relatively unimportant. But by grouping the number of ads into different groups of high exposure and low exposure and comparing them both to the no exposure group, it will be a better indicator of determining whether or not DTC advertising has an effect on the likelihood of visiting a healthcare practitioner. In the second specification (Appendix Tables A3A-1 through A3A-3) the continuous exposure measure was subjected to a log linear transformation. This transformation allows the relationship between exposure and the probability of doctors to have diminishing marginal effects. This would imply that the distribution of the normal curve is positively skewed. In the third model (Appendix Tables A3B-1 through A3B-3) I used a quadratic transformation. This transformation assumes the relationship between exposure and the probability of a doctor visit to be one where the effects of DTC advertisements will increase to a certain point and then begin to decline. I want to determine if any of these particular effects are true in the case of DTC advertising exposure, and that is why I intend to explore them.

Results indicate that the entire sample of the model for both the general practitioner and podiatrist are responsive to a log linear transformation. Likewise it appears as though the male sample is not sensitive whatsoever to this particular transformation. The female sample however was sensitive for both the general practitioner as well as the podiatrist. Again similar to the results above it appears as though exposure to DTC advertising for antidepressants has some effect on the likelihood of visiting a general practitioner for both the entire sample as well as the

female sample. There is no significant effect for the male sample. It is important to note however that for the reliability test (the podiatrist), that the significant effects were negative, implying that an increase in exposure to DTC advertisements for antidepressants decreased the likelihood of visiting a healthcare practitioner. If the effects were positive, I would be more concerned that the exposure measures were not operating correctly. By using the log linear transformation and generating significant effects, we see that there are some diminishing marginal effects, but it is very small.

In terms of the quadratic sample, there are very small effects for the squared number of advertisements exposed to on the likelihood of visiting a healthcare practitioner. However it does appear as though the female sample was sensitive on the likelihood of visiting a podiatrist in that it decreased the likelihood of visiting the podiatrist. If the opposite were the case and there was a positive significant effect, that would be more disconcerting in regards to the exposure measures not operating correctly. But since this is not the case I would be less concerned that the exposure measures are operating incorrectly. The effect was also sensitive on the likelihood of visiting a podiatrist for the entire sample as well. Finally the male sample appeared to be sensitive to this transformation when it influenced the likelihood of visiting a practitioner. Like the log linear transformation there is some significant variation explained by using this transformation, but the effects are also relatively small.

Summary

In this work, I tested whether exposure to DTC advertising for antidepressant products affects the probability of an individual visiting a particular type of healthcare practitioner. In

addition I tested whether these effects were different for male and female populations. I also used a reliability measures to test the validity, of my results and it appears as though the exposure measures from my dataset are operating correctly. This study is novel in that it is the first to use individual level data to detect the effects of DTC advertising. Primarily past research was done utilizing market level data as opposed to individual level exposure measures. Whereas market level data does not allow the investigator to draw a causal inference between DTC exposure and whether an individual goes to a healthcare practitioner, our study is able to. It is important to note that our study also has the ability to control for targeting by advertisers.

There are several important findings that I make as an attempt to build on existing literature. It appears as though DTC advertising does have some influence on the likelihood of an individual to visit a healthcare practitioner, specifically a general practitioner for females and a practitioner for males. I am unable to tell with my data whether the outcome is socially desired or not. For example, it could be that the ads led to visits by people for whom medication was inappropriate or could have lead to diagnosis of other conditions. Another possibility is that exposure will have an individual go to their general practitioner to discuss a health issue other than depression. Secondly we find that the effects of DTC advertising are different for each gender. Whereas DTC advertising appears to have little to no effect on the male population, it does appear to have a large and significant effect on females even after using the strongest of controls for targeting. This is consistent with findings in Avery et al (2009) that showed the effect of DTCA on consumption of antidepressants also had larger impacts for females.

The findings of this study are important to consider in the policy arena. If DTC advertising does have an influence on whether an individual goes to a healthcare practitioner, it could become a powerful tool to encourage individuals to seek care. Depression is one of the

most under diagnosed diseases in the world. It would be important for DTC advertising therefore to be used on diseases that are under diagnosed. In addition DTC advertising could be targeted towards populations that do not tend to visit healthcare practitioners often. This includes minority populations. If officials can harness DTC advertising correctly it could be an extremely valuable tool to ensure American's either get healthy or remain healthy.

The contribution of my paper is the ability to use individual data to investigate the causal impact of advertising exposure, on the likelihood of that individual visiting a healthcare practitioner. I am able to do this by using two unique and distinct datasets that can generate individual level exposure. By doing so I am able to look at individuals who are otherwise completely the same that were exposed to a different number of print advertisements for antidepressants during the past year. The key finding made is that individuals who are exposed to DTC advertisements for antidepressants are more likely to visit certain types of healthcare practitioners. However this effect appears to be primarily in females for the general practitioner and primarily for the practitioner in males. It could be that females are more conscience of their mental health or physical health status. Perhaps females are more susceptible to depression that DTC advertising exposure convinces females to seek help for their affliction.

However due to the limitations of our data I am unable to fully conclude the effects of DTC advertising. This is because I am unable to determine why the respondent went to their general practitioner. In addition I lack the ability to determine the likelihood an individual goes to visit a psychiatrist, since this form of practitioner is not present in my dataset. It is the hope of this researcher that future research on this subject is able to improve on the causal link that we have developed. More investigation should be done on the different effects DTC advertising has on both male and female populations. This is the second study that has used individual level

exposure to find effects differentiated by gender (Avery et al. 2009). Finally it would be the recommendation of this researcher that this research be expanded to other pharmaceutical categories. I hope to investigate other classes of pharmaceuticals in the future to determine whether or not there are consistent effects across classes.

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APPENDIX TABLES

Table A3A -1. Results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – General practitioner – using log linear transformation of exposure measures.

Independent Variables	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value
ln(exposure)	0.002	3.591	0.000	0.000	-0.358	0.720	0.003	3.022	0.003

Table A3A-2. Results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – Practitioner – using log linear transformation of exposure measures.

Independent Variables	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value
ln(exposure)	0.000	-0.792	0.429	0.001	1.123	0.261	0.000	-0.408	0.683

Table A3A - 3. Results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – Podiatrist – using log linear transformation of exposure measures.

Independent Variables	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value
ln(exposure)	-0.001	-2.752	0.006	0.000	-0.336	0.737	-0.001	-2.124	0.034

Table A3B - 1. Results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – General practitioner – using quadratic transformation of exposure measures.

Independent Variables	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value	Coeff.	T-STAT	P-value
Exposure	0.000	-0.306	0.760	0.000	-0.364	0.716	0.000	-0.898	0.369
Exposure Squared	0.000	0.111	0.911	0.000	-0.116	0.908	0.000	0.964	0.335

Table A3B-2. Results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – Practitioner – using quadratic transformation of exposure measures.

Independent Variables	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P -value	Coeff.	T-STAT	P -value	Coeff.	T-STAT	P -value
Exposure	0.000	0.415	0.678	0.001	2.399	0.016	0.000	-0.839	0.402
Exposure Squared	0.000	0.247	0.805	0.000	-2.197	0.028	0.000	1.174	0.240

Table A3B-3. Results: Impact of exposure to DTC antidepressant advertising on probability of visiting a physician – Podiatrist – using quadratic transformation of exposure measures.

Independent Variables	Full Sample (N=95,417)			Male Sample (N=42,244)			Female Sample (N=53,173)		
	Coeff.	T-STAT	P -value	Coeff.	T-STAT	P -value	Coeff.	T-STAT	P -value
Exposure	0.000	-1.621	0.105	0.000	0.794	0.427	-0.001	-2.258	0.024
Exposure Squared	0.000	1.820	0.069	0.000	-1.060	0.289	0.000	2.353	0.019