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The Effect of Direct-to-Consumer Advertising on Prescription Drug Use by Older Adults

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Abstract

Background and objective: Although older adults are frequent consumers of prescription drugs and increasingly the intended audience of direct-to-consumer advertising (DTCA) marketing efforts, little is known about the effect of DTCA on older adults' prescription drug-seeking behaviour. In response, the objective of this study is to examine factors associated with requesting a prescription drug from a physician following exposure to DTCA among older adults, and whether the drug or other medical treatment was prescribed during the encounter.

Methods: A secondary data analysis of the "Public Health Impact of Direct-to-Consumer Advertising of Prescription Drugs", a data set publicly available through the Inter-university Consortium for Political and Social Research (ICPSR 3687), was conducted. For the purposes of this study, only those respondents who indicated that they had been exposed to DTCA (n = 2601) were included in the study sample. Using a two-step weighted logistic regression approach, separate models were estimated to examine first, whether a request for the advertised drug was made following exposure to DTCA and secondly, the outcomes of any patient-physician encounters that occurred following exposure to DTCA.

Results: Descriptive analysis of the outcome variables revealed that, among respondents exposed to DTCA, 31% (n = 801) requested a prescription drug from their physician. Approximately 5% of those who made a request were ≥75 years of age. Among respondents requesting a prescription drug, 69% (n = 556) received a prescription in response to their request, of whom, approximately 5% were ≥75 years of age. Multivariate findings suggest that although adults ≥75 years of age are less likely to request a prescription drug following exposure to DTCA (odds ratio [OR] = 0.58; p = 0.032), when they do approach their physicians, they are more likely to receive recommendations for further treatment, with ORs indicating a 250% (OR = 3.507; p = 0.002) increase in the odds of further referral among adults ≥75 years of age.

Conclusion: Overall, results from the study suggest that DTCA influences the patient-doctor relationship and prescription drug acquisition behaviour of patients; however, the nature of the effect of DTCA on older adults is complex. Because future cohorts of older adults may be more comfortable about requesting prescription drugs and the consumer-driven approach to obtaining medical care,

understanding the impact of DTCA on older consumers represents an important area for further inquiry.

Television, radio and WorldWideWeb advertisements encouraging individuals to ask their physician about the potential benefit of beginning a new drug therapy are commonplace in the US.[1] Following changes to the US FDA guidelines governing prescription drug advertising, direct-to-consumer advertising (DTCA) spending has increased sharply,[2] with an estimated spending increase from nearly $US800 million in 1996 to $US3.2 billion in 2005.[3] Although older adults (defined as ≥65 years of age unless otherwise stated) are frequent consumers of prescription drugs and increasingly the intended audience of DTCA marketing efforts, little is known about the effects of DTCA on older adults' prescription drug-seeking behaviour. In response, the objective of this paper is to report on an attempt to explore the extent to which DTCA encourages older consumers to request a prescription drug from their physician and the outcome of that encounter.

Although previous research has yielded mixed findings regarding the extent to which DTCA affects physicians' behaviour in response to patient requests, recent findings indicate that physicians believe DTCA negatively affects physician-patient communication by increasing the length of visit times, increasing consumer demand for unnecessary prescriptions, and eroding physician authority by minimising the physician's role as a medical advisor.[4] Additionally, physicians report that they believe DTCA provides inadequate and misleading information in terms of adverse effects, costs, effectiveness and the availability of alternative treatments.[5,6] Importantly, however, research suggests that requests for prescription drugs are granted despite physicians' misgivings about DTCA,[5] whether clearly defined clinical symptoms specific to the condition are present or not,[7] whether similarly effective drugs are available and even in cases when the consumers' requests are clinically inappropriate.[8]

Conversely, positive outcomes of DTCA are reported in the literature as well. For example, a recently conducted national consumer survey of DTCA found that following DTCA exposure, patients self-reported greater involvement in medical decision-making and increased compliance with prescription medication intake.[9,10] Likewise, similar results have been reported by the Kaiser Family Foundation, who also report that consumers view DTCA as an additional source of healthcare information about available treatments for specific conditions.[11] Additionally, Weissman et al.[8] report that DTCA not only increases patient-doctor communication, but consequently, may lead to the diagnosis of previously undiagnosed medical conditions. Other studies suggest that DTCA may serve as a vehicle for initiating discussion about important health matters between patients and their doctors, leading to additional diagnostic testing, increased preventive care services and greater use of referral to specialists following exposure to DTCA.[12]

Although previous research suggests that older adults perceive DTCA to contain less information and to be less useful from a healthcare perspective than younger adults, little is known about their actual drug-seeking behaviour and the outcomes of those requests, once made.[13] However, because older adults are more apt to experience multiple chronic co-morbidities, be under the care of multiple physicians, have decreased physiological reserve, and use multiple medications,[14] understanding the impact of DTCA on older adults' prescription drug-seeking and drug use behaviour represents an important, but underdeveloped area of research, especially given older adults' increased odds of experiencing adverse effects and/or drug-drug interactions.[15] Moreover, the recent expansion of Medicare to include prescription drug coverage, which most likely will encourage increased DTCA aimed at older adults, raises further questions about the potential for inappropriate prescribing behaviour and mass introduc-

tion of potentially harmful drugs. This is particularly the case given recent findings that cyclo-oxygenase (COX)-2 inhibitors were more frequently prescribed to those who were exposed to a drug advertisement, even though a NSAID would have been a more appropriate choice.[16] In response, this study examines factors associated with requesting a prescription drug from a physician following exposure to DTCA among older adults, and whether the drug or other medical treatment was prescribed during the encounter.

Methods

Data Source

For the purposes of this study, a secondary data analysis of the "Public Health Impact of Direct-to-Consumer Advertising of Prescription Drugs", a data set publicly available through the Inter-university Consortium for Political and Social Research (ICPSR 3687), was conducted. Because the data and methods have been described in detail elsewhere,[6,8] only a brief description is provided here. Originally, data were collected by Harris Interactive for an unrelated study conducted by investigators at Harvard University and Massachusetts General Hospital, between July 2001 and January 2002. A nationally representative sample of 3000 adults ≥18 years of age residing in the continental US was identified via computerised random digit dialing and random household member selection. The final questionnaire, which contained items designed to elicit information about exposure to DTCA, discussions with the doctor upon DTCA exposure, visit outcomes, as well as information about the respondent's prior and present health status, healthcare use, insurance status and basic demographic information, was developed following literature review, focus group, cognitive testing and pretesting. Because the data have been used to examine the effects of DTCA on prescription drug-seeking behaviour of adults in prior studies and contain information on prior health status, the data provide a rich and detailed source for exploring the effects of DTCA on older adults.

Sample Characteristics

For the purposes of this study, only those respondents who indicated that they had been exposed to DTCA (n = 2601) were included in the study sample. These respondents reported that they had been exposed to DTCA either directly, by viewing material such as: television advertisements, Internet advertisements, printed materials in magazines and similar sources; or indirectly, by being informed about the DTCA through other persons, such as family members or friends, who were exposed to DTCA. Among those included in the current study, the majority of subjects identified themselves as White (81%), female (53%) and 46 years of age, on average. Fewer than 6% of the respondents reported having received less than a high school education, whereas the average respondent reported completing 12 years of education. Older adults (≥65 years of age) comprised 17% of the study sample. Most of the respondents reported being in good health (85%), while only 14% described themselves as being in poor to fair health. Also, most respondents reported having a regular medical doctor (83%) and 11% of study subjects indicated that they had visited a physician in the last year. Approximately 10% of the respondents had no health insurance of any kind, whereas among those with some health insurance, 7% reported that no prescription drug coverage was included.

Measures

Table I contains definitions for all study variables included in the analyses, as well as the mean and standard deviation for each.

Dependent Variables

For the purposes of this study, three dependent variables were specified as dichotomous measures to explore the influence of DTCA on prescription drug acquisition behaviour following exposure. The first, "Asked doctor about DTCA drug," was set to one for those respondents who reported that following exposure to a DTCA, the respondent visited their physician and requested the advertised drug, and zero, otherwise. The second, "Received Rx (pre-

Table I. Sample characteristics and variable definitions (n = 2601)

Variables	Definition	Mean	SD
Dependent variables			
Asked doctor about DTCA drug (n = 801)	Asked doctor for prescription = 1; 0 = otherwise	0.3079	0.4617
Received Rx (n = 556)	Doctor gave requested drug = 1; 0 = otherwise	0.6941	0.4610
No Rx – other recommendation given (n = 1993)	Doctor ordered further referral = 1; 0 = otherwise	0.1110	0.3142
Independent variables (n = 2601)			
Demographic variables			
sex	Male = 1; 0 = otherwise	0.4721	0.4993
education	Less than high school = 1; 0 = otherwise	0.0588	0.2553
age (years)			
18–34 (omitted reference category)	Age 18–34 = 1; 0 = otherwise	0.2798	0.4490
35–64	Age 35–64 = 1; 0 = otherwise	0.5470	0.4978
65–74	Age 65–74 = 1; 0 = otherwise	0.1034	0.3045
≥75	Age ≥75 = 1; 0 = otherwise	0.0657	0.2478
African American	African American = 1; 0 = otherwise	0.0415	0.1955
Individual health and health-seeking behaviour			
poor health	If respondent rated health as poor or fair = 1; 0 = otherwise	0.1441	0.3513
last visit	If last visit to doctor was more than 1 year ago = 1; 0 = otherwise	0.1150	0.3190
regular medical doctor	If respondent had a regular medical doctor = 1; 0 = otherwise	0.8377	0.3687
Health insurance status			
uninsured	If respondent had no insurance = 1; 0 = otherwise	0.1018	0.3025
no drug coverage	If respondent's insurance provided no drug coverage = 1; 0 = otherwise	0.0711	0.0257
Family composition			
number of adults at home ≥18 years of age	Total number of adults in the home ≥18 years of age	1.9473	0.8450
number of children at home	Total number of children <18 years of age at respondent's home	0.7237	1.082

DTCA = direct-to-consumer advertising; **Rx** = prescription drug.

scription drug)", was set to one for those respondents who had requested a prescription drug from their physician following DTCA and who received a prescription drug upon request, and zero, otherwise. Because it is possible that a respondent received a prescription drug other than the one requested, non-DTCA drugs are included. However, because drug classifications are not available, further detail is limited. The third dependent variable, "No Rx – other recommendation given," was set to one if the respondent reported that they had requested a prescription drug following DTCA exposure, but did not receive it, and instead, received treatment recommendations other than the advertised drug (e.g. additional laboratory tests, recommendations for lifestyle changes, referral to a specialist or recommendation to try an over-the-counter-drug) and zero, otherwise. Importantly, respondents could and did respond to more than one category, and some overlap therefore exists. For example, a respondent could request a drug, receive it, and be referred for additional medical testing.

Independent Variables

Sociodemographic Variables

The following variables were specified to control for differences in sociodemographic characteristics among respondents that potentially may influence prescription drug-seeking behaviour: male gender, less than a high school education and African American status. Because male patients tend to visit physicians less frequently than female patients,[17] male

respondents are expected to be less likely to report requesting a prescription drug following DTCA exposure. However, because research suggests that health complaints made by female patients may be viewed as less urgent than those made by male patients,[18] male respondents are expected to be more likely to receive a prescription following a request than are their female counterparts. Because prior research has firmly established that education influences health and healthcare-seeking behaviour,[19] individuals with less than a high school education are expected to be less likely to request or receive a prescription drug following exposure to DTCA. Previous research suggests that following a request, African Americans are less likely to receive prescription drugs from their primary care physicians in comparison with their otherwise similar White counterparts.[20] To explore this relationship further, we included a dichotomous variable set to one if the respondent was African American, and zero, otherwise. Age served as the variable of study interest. To investigate whether older adults differ from their younger counterparts in prescription drug-seeking behaviour following exposure to DTCA, and whether older adults differ in the outcomes of those requests, age was included as a set of dummy variables (18–34 years of age, 35–64 years of age, 65–74 years of age and ≥75 years of age), set to one if the respondent's age fell into one of the age groupings, and zero, otherwise. For the purposes of this study, respondents 18–34 years of age served as the omitted reference category.

Individual Health and Health-Seeking Behaviour

Because an individual's health status and past history of healthcare utilisation most likely affects their response to DTCA, we included three covariates to capture differences among respondents with respect to health status and healthcare-seeking behaviour. A variable set to one if the individual reported poor health, versus zero, otherwise, was included to capture differences in overall health. To control for differences in healthcare-seeking behaviour, a dummy variable, set to one if the respondent reported not visiting any physician in the prior year, and zero, otherwise, was included. Also, to control for ease in accessing medical care, a dummy variable set to one if the respondent reported having a regular physician, and zero, otherwise, was included.

Health Insurance Status

Because lack of healthcare insurance will affect individual access to healthcare as well as potentially a physician's decision to accede to a patient's request,[21] two dummy variables were included to capture differences in healthcare insurance status among respondents. The first was set to one if the respondent reported having no health insurance, and zero, otherwise. The second variable was set to one if the individual reported having insurance but no prescription drug coverage, and zero, otherwise.

Family Composition

Because parents assume an advocacy role on their child/children's behalf, adults with dependent-aged children in the home may be more apt to be influenced by DTCA and, therefore, may be more likely to approach a physician with a specific request for a prescription drug.[22] Thus, to control for this possibility, we included a count of the number of children in the home <18 years of age. Similarly, because adults may be influenced by the opinions of others with respect to whether they should request a prescription drug, a second variable, also specified as a continuous measure, was included to capture the number of adults ≥18 years of age in a single household.

Estimation Procedures

A two-step approach to modelling outcomes of DTCA was used. Two-step logistic regression techniques allow the probability of one event to be estimated when the occurrence of that event is not entirely independent from some other event, or when some process of self-selection is occurring, making the probability of one event conditional on the first.[23] In the first step, a general model estimating the odds of requesting a prescription drug following exposure to DTCA versus otherwise was specified. In the second step, two separate models were estimated to examine the outcomes of the

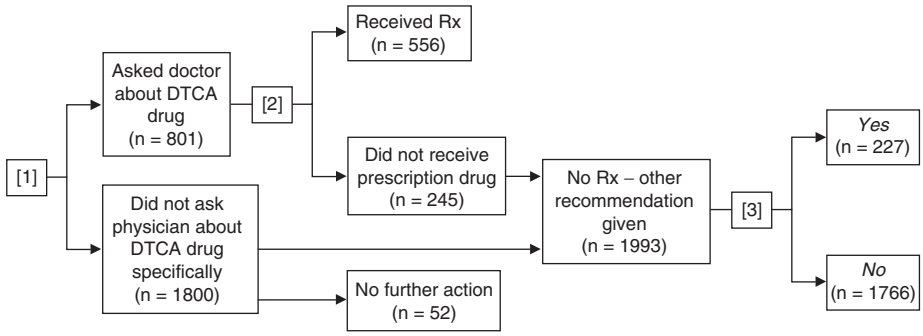

Fig. 1. Approach to estimation procedures. **DTCA** = direct-to-consumer advertising; **Rx** = prescription drug.

request. The first of these modelled whether the requested drug was received, given that a request occurred, whereas the second estimated whether an alternative outcome occurred if a prescription drug was not provided. Figure 1 illustrates the branches followed in the estimation procedures, as well as the sample size available for each procedure.

All models were estimated following the same basic form using weighted logistic regression in which the probability of a given outcome is specified to be a function of sociodemographic characteristics, individual health and health-seeking behaviour attributes, health insurance status and family composition living arrangements. The standard errors of all logit parameter estimates were adjusted using population respondent weights to adjust for potential sampling bias associated with the complex survey design. Estimations were obtained using survey design options available in STATA®, version 7 [1] (StataCorp., College Station, TX, USA).[24]

Results

Descriptive analysis of the outcome variables revealed that, among respondents exposed to DTCA, 31% (n = 801) requested a prescription drug from their physician. Approximately 5% of those who made a request were ≥75 years of age. Among respondents requesting a prescription drug, 69% (n = 556) received a prescription in response to their request, of whom, approximately 5% were ≥75 years of age. Among respondents who either made no direct request for a prescription drug, or who did so but did not receive a prescription in response (n = 1993), roughly 11% received a recommendation for further treatment, of whom 7.4% were ≥75 years of age.

Factors Associated with Requesting a Prescription Drug

Table II presents the empirical results from all three models, including estimated coefficients, z statistics, and the corresponding odds ratios (OR) and p-values. Study findings suggested that respondents who requested a prescription drug after watching or hearing about a DTCA drug advertisement were significantly more likely to be African American, have young children in the home and to have reported being in poor health. In addition, findings suggested that adults ≥75 years of age, male respondents and those reporting no physician visits in the previous year were less likely to request a prescription drug following exposure to DTCA. Likewise, the odds that male respondents requested a prescription drug following exposure to DTCA were 26% lower than those of their otherwise similar female counterparts. The odds that respondents with no primary care visits in the previous year made a request were reduced 51% (OR = 0.49) in comparison with those respondents reporting a recent visit to their physician. Consistent with past research findings,[20] African Americans were found to have increased odds of requesting a prescription drug fol-

1 The use of trade names is for product identification purposes only and does not imply endorsement.

Table II. Odds ratios from weighted logistic regressions: exploring the effect of direct-to-consumer advertising (DTCA) on prescription drug use and related outcomes

Variable	Asked doctor about DTCA drug (n = 2601)		Received Rx (n = 801)		No Rx – other recommendation given[a] (n = 1993)	
	odds ratio	p-value	odds ratio	p-value	odds ratio	p-value
Male	0.742	0.003**	0.817	0.257	0.819	0.286
Less than high school education	0.867	0.484	0.693	0.326	0.945	0.879
Age 35–64 years	1.029	0.800	1.699	0.010**	2.008	0.005**
Age 65–74 years	0.839	0.353	1.507	0.230	2.743	0.003**
Age ≥75 years	0.586	0.032*	1.280	0.566	3.507	0.002**
African American	1.575	0.047*	0.378	0.006**	1.348	0.494
Uninsured	1.009	0.954	0.939	0.835	1.888	0.023*
No Rx coverage	1.119	0.575	0.968	0.930	0.731	0.454
Regular medical doctor	1.239	0.161	0.969	0.909	1.058	0.843
Children at home	1.131	0.007**	1.183	0.057	1.006	0.936
Adults at home	0.949	0.421	1.059	0.584	1.109	0.325
Poor health	1.568	0.001***	1.359	0.216	1.769	0.016**
Last visit ≥1 years	0.498	0.000***	0.714	0.214	0.667	0.119

a Model results adjusted for prior prescription drug request without receipt of prescription drug.

Rx = prescription drug; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

lowing DTCA, with the OR indicating a 58% (OR = 1.58) increase compared with their otherwise similar study counterparts. However, it is unclear whether African Americans have increased odds because they are more likely to be targeted by DTCA, to be exposed to DTCA, to have conditions frequently the focus of DTCA, or are more responsive to DTCA.

Among respondents with children <18 years of age, the OR of 1.13 suggested, that with each additional child in the home, the odds of requesting a prescription drug increased by 13%, perhaps reflecting greater comfort in approaching physicians with specific requests. The study results also indicated that respondents who described themselves as being in poor health had 56% (OR = 1.56) greater odds of requesting a prescription drug from their physician following exposure to DTCA than did their otherwise healthy counterparts. This finding may suggest that individuals who are in poor health are more likely to be receptive to the information provided in DTCA, or alternatively, that DTCA may be more frequently targeted at individuals with common conditions associated with poorer health status.

Although older adults are more likely to report poor health, the study findings indicated that the odds that a prescription drug was requested following exposure to DTCA among respondents ≥75 years of age were reduced by 42% (OR = 0.58), in comparison with respondents in the omitted reference category (18–34 years of age). The implications of this finding are explored in the discussion section of the paper.

Factors Associated with Receiving a Prescription Drug

Only two factors were found to be significantly associated with receipt of a prescription drug following a DTCA-influenced request. Study findings suggested that although African Americans were more likely to ask their doctor for prescription drugs, they were less likely to receive a prescription in response to their request. Specifically, the study findings suggested that the odds of African Americans receiving their prescription were reduced by

63% (OR = 0.37) in comparison with their otherwise similar counterparts. Most likely, this finding reflects a complex interaction of variables, including socioeconomic status, education, healthcare accessibility and a lack of continuity in care, as well as systemic factors ingrained in the healthcare system. Although older adults appeared no more or less likely to receive a prescription drug, findings suggest that individuals 35–64 years of age have 69% (OR = 1.69) greater odds of receiving a prescription in response to their request than adults aged 18–34 years. Most likely, this finding reflects the frequent targeting of individuals in mid-adulthood by DTCA.

Factors Associated with Further Referral

Much interest has surrounded the question of whether DTCA affects healthcare spending beyond that associated with prescription drug use. Our findings suggest that DTCA may have an unintentional effect of increasing referral for procedures/treatments other than prescription drug use. For example, with increasing age, requests for prescription drugs are more likely to result in recommendations for other treatment. Results indicated that the odds of further referral were increased by 101%, 174% and 251% among those making a request 35–64 years of age, 65–74 years of age and ≥75 years of age, respectively. Additionally, study findings suggested that individuals who report being in poor health have significantly greater odds (OR = 1.77) of receiving further referral recommendations than their otherwise similar counterparts. Similarly, respondents who were uninsured had 89% (OR = 1.89) greater odds of receiving a referral for treatment options other than the advertised prescription drug. Considered together, these findings suggest that physicians are sensitive to the health status of their patients before beginning a new drug therapy, perhaps proceeding cautiously in the face of advancing age and poor health status.

Discussion

The rapid increase in DTCA has prompted researchers and policy makers to question whether DTCA primarily increases unnecessary costs through the substitution of physician services and prescription drugs for conditions that hitherto would have been self-managed with over-the-counter drugs or whether DTCA provides a valuable source of healthcare information for uninformed individuals[25] that ultimately may improve their healthcare outcomes.[12] The findings from this study suggest that the ongoing controversy may persist, at least in part, because the focus of DTCA, which spans a continuum of conditions including minor annoyances (e.g. terbinafine to treat fungal infections) to serious health threats (e.g. indinavir to treat HIV-1 infection), appears to affect subpopulations of consumers differently. For example, our findings suggest that although older adults appear less likely than younger consumers to request a specific drug following exposure to DTCA, older adults are more likely to be referred for additional medical services, including recommendations for specialty visits and diagnostic testing. Moreover, a comparison of the OR by age categories suggests that the likelihood of receiving recommendations for treatment other than the requested drug increases with age, as the log-odds of receiving further treatment referrals among adults 65–74 years of age and adults ≥75 years of age were found, respectively, to be increased by 37% and 75% in comparison with the log-odds obtained for adults 35–64 years of age. The finding that older adults are less apt to request a specific drug may reflect their reluctance to approach their physician with specific prescription drug requests; however, the finding may also reflect less responsiveness among older adults to DTCA or fewer advertisements targeted at adults ≥75 years of age.

Notably, however, the strong relationship between the age of consumer at the time of the request and recommendations for further treatment reflects the complexity of healthcare needs among this segment of the population. Because previous research has firmly established that older adults have more chronic health conditions,[26] and are on more medications,[14] physicians must proceed cautiously before adding another prescription to what already may be a lengthy list. Thus, the challenge to balance the management of pre-existing conditions with

competing medical complaints from either unrelieved, newly emerging or previously unidentified symptoms/conditions, represents a formidable challenge. Moreover, the finding that individuals who report poorer health status are more likely to receive further medical referral, whereas African Americans are less likely to receive a prescription drug, provides additional support for the assertion that differential outcomes of DTCA by subpopulations exist.

However, this does not answer the question of whether referrals represent needed treatments or unwarranted care. On the one hand, increased referrals among older adults for further medical testing may lead to the diagnosis of a previously undiagnosed or poorly managed medical condition at a stage early enough to curtail the future expenses of treating the same condition at a later stage. Conversely, the tendency to respond to requests for prescription drugs by older adults with recommendations of further medical testing may increase healthcare expenditures among older adults by encouraging them to undergo expensive, but unnecessary, medical care. Moreover, the effect of DTCA on increased use of medical services may further be complicated by the apparent 'spill-over' effect of DTCA on consumer outcomes, as suggested by the finding that individuals who do not specifically request a prescription drug may still discuss related healthcare concerns with their physician, resulting in recommendations for further treatment, as well.

Lastly, the findings presented here raise questions about the future of DTCA in light of the introduction of the Medicare Prescription Drug, Improvement and Modernization Act, which adds some prescription drug benefits to Medicare. The introduction of a third-party payer may increase the willingness of older adults to approach physicians and request a specific prescription drug if the Act mitigates what has traditionally been one of the largest sources of out-of-pocket medical costs among Medicare beneficiaries. Moreover, with increased drug coverage, physicians may be more inclined to prescribe drugs to older adults, which in turn may provide additional encouragement for DTCA specifically targeted at older adults. Because of the complexity of older adult healthcare needs, however, an increase in referrals for additional medical testing would be expected to follow. In addition, previous research has suggested that DTCA generally focuses on limited therapeutic classes of drugs.[1] The therapeutic classes of drugs to be included under the Medicare drug benefit are still under development by the US Pharmacopoeia. The inclusion of certain drugs in the Medicare Modernization Act that may benefit older adults almost exclusively (e.g. drugs to treat dementia), will most likely affect the marketing of DTCA with respect to older adults. In other words, with the provision of prescription drug coverage to Medicare beneficiaries under the new Act, targeting by pharmaceutical companies will most likely result in an increased older consumer base as well as an expanded class of drugs. Consequently the trend of marketing prescription drugs directly to older consumers will likely continue.

Study Limitations

Although our study provides insight into differential outcomes of DTCA exposure related to age, caution in interpreting our study findings is urged. Because a control group of individuals not exposed to DTCA was unavailable, only cross-sectional comparisons are presented here, potentially confounding study results. For example, the effect of age or African American status may reflect other historical or social factors, as well as population case-mix differences, which are beyond detection with the available study data. However, because previous research has empirically established that DTCA influences physician prescribing behaviour[7] and because study findings presented here are based on a nationally representative sample of adults, group comparisons following DTCA exposure are informative with respect to differences across age-groups.

Importantly, it should also be noted that whereas this study explored outcomes for older adults following exposure to DTCA, the intended audience of the advertisement is uncontrolled. For example, earlier work by Woloshin et al.[25] noted that advertise-

ments for Aricept®, (Eisai Inc., Teaneck, NJ, USA) a heavily marketed drug for the treatment of Alzheimer's disease, frequently appeared in magazines whose readership typically comprises women in their mid-forties. Older adults, therefore, may be targeted by pharmaceutical companies in a number of ways, including advertisements targeted at family members who are in a position to influence elders' medical care. To the extent that this study focused only on individual reactions to DTCA, the effect of DTCA on older adults' prescription drug use and other medical care outcomes may be underestimated.

Conclusion

Overall results from the study indicated that DTCA does succeed in influencing the prescription drug acquisition behaviour of older adults, but the effect of DTCA on older adults is complex. Understanding this relationship in light of the pending expansion of Medicare raises several important areas for future research, including the appropriateness of drug prescribing for older patients following exposure, the costs associated with substitution of newer drugs whose efficacy may not be established for a more vulnerable population using multiple medications, and the contribution of increased referral services in an era of increasing medical costs and funding shortfalls. Moreover, because future cohorts of older adults may be more comfortable in requesting prescription drugs as well as with a consumer-driven approach to obtaining medical care, understanding the impact of DTCA on older consumers represents an important area for further inquiry. Future studies investigating the interaction of age with other consumer characteristics, as well as those employing more specific measures of health outcomes, are needed and should provide valuable information about the effect of DTCA on older adult prescription drug use and healthcare outcomes.

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