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Is There a Relationship Between Patient Beliefs or Communication About Generic Drugs and Medication Utilization?

William H. Shrank, MD, MSHS[*], **Suzanne M. Cadarette, PhD**[*], **Emily Cox, PhD**[†], **Michael A. Fischer, MD, MPH**[*], **Jyotsna Mehta, MA**[*], **Alan M. Brookhart, PhD**[*], **Jerry Avorn, MD**[*], and **Niteesh K. Choudhry, MD, PhD**[*]

[*]*Division of Pharmacoepidemiology and Pharmacoeconomics, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts*

[†]*Express Scripts Inc, St. Louis, Missouri.*

Abstract

Background—Insurers and policymakers strive to stimulate more cost-effective prescribing and, increasingly, are educating beneficiaries about generics.

Objectives—To evaluate the relationship between patient beliefs and communication about generic drugs and actual drug use.

Research Design and Subjects—We performed a national mailed survey of a random sample of 2500 commercially-insured adults. Patient responses were linked to pharmacy claims data to assess actual generic medication use.

Measures—We used factor analysis to develop 5 multi-item scales from patient survey responses that measured: (1) general preferences for generics, (2) generic safety/effectiveness, (3) generic cost/value, (4) comfort with generic substitution, and (5) communication with providers about generics. The relationship between each scale and the proportion of prescriptions filled for generics was assessed using linear regression, controlling for demographic, health, and insurance characteristics. Separate models were created for each scale and then all 5 scales were included simultaneously in a fully-adjusted model.

Results—The usable response rate was 48%. When evaluated independently, a 1 SD increase in each of the 5 scales was associated with a 3.1% to 6.3% increase in generic drug use ($P < 0.05$ for each). In the fully adjusted model, only 2 scales were significantly associated with generic drug use: comfort with generic substitution ($P = 0.021$) and communication with providers about generic drugs ($P = 0.012$).

Conclusions—Generic drug use is most closely associated with the 2 actionable items we evaluated: communication with providers about generics and comfort with generic substitution. Educational campaigns that focus on these 2 domains may be most effective at influencing generic drug use.

Keywords

generic; medications; utilization; perceptions; communication

Reprints: William H. Shrank, MD, MSHS, Division of Pharmacoepidemiology and Pharmacoeconomics, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, 1620 Tremont Street (Suite 3030), Boston, MA 02120. E-mail: E-mail: wshrank@partners.org.

Appropriate and cost-effective prescribing is a major goal for all participants in the health care system. Numerous approaches to influence prescribing behavior have been implemented, aiming at the doctor,[1–3] pharmacy,[4,5] and patient. [6–9] Many of these interventions specifically aim to increase generic drug use[1–9] because generic drugs can substantially reduce costs without compromising quality when they are used in appropriate clinical settings.[10] To further this goal, insurers and health systems have developed educational campaigns to improve patient perceptions about the value of generics,[11] based on the assumption that patients will use this information to influence which medications are prescribed to them.

Much of the variation in generic prescription drug use has been studied in terms of physician-level variables,[12,13] pharmacy characteristics,[13,14] cost-sharing requirements,[9,14] patient sociodemographics,[14,15] and administrative barriers to branded medications (eg, prior-authorization).[8] A number of studies over the last 3 decades have explored patient preferences for generic medications, and have described varying perceptions about the safety, efficacy, and costs of generics as well as patient self-reported willingness to use generic medications.[16–20] However, none of these studies linked patient self-reported perceptions of generic drug use with their actual prescription drug purchasing behavior, as captured in electronic pharmacy claims data. In addition, little is known about the effect of patient communication with providers about generic drugs on actual drug use.

Better evidence about the strength of the relationship between medication use, patient perceptions about generic drugs, and their communication with physicians about generics could help guide patient education strategies. A more nuanced understanding of the relationship between perceptions about generic medication safety, efficacy, and value and medication choice could inform the content and structure of these programs. Evidence of a strong relationship between generic medication use and patient comfort with generic substitution could offer additional targets for educational campaigns.

To evaluate the relationship between patient perceptions or communication about generics and their actual patterns of generic medication use, we surveyed a national random sample of commercially-insured patients and linked their responses with pharmacy claims defining their patterns of actual medication use.

METHODS

Study Sample

Between February and April of 2007, we surveyed a random sample of commercially-insured beneficiaries who received prescription drug coverage from a large, national pharmacy benefits manager. We included beneficiaries over age 18 who filled at least 1 prescription claim through their pharmacy benefits manager in the previous year. Beneficiaries were excluded if they were 95 or older or if they filled at least 1 prescription for a medication to treat cognitive impairment (eg, donepezil, rivastigmine, or tacrine). We also excluded patients who were insured by Medicaid or who filled any prescriptions for antiretroviral medications because they may have obtained overlapping or additional prescription drug coverage. We surveyed 2500 patients from all 50 states and the District of Columbia. We selected our sample size to estimate descriptive statistics with narrow confidence intervals (CIs) (95% CIs with a width of less than 5 percentage points) conservatively assuming a response rate of 40%.

Data Collection

We mailed each beneficiary in the sample an introductory postcard followed by a questionnaire including a $1 cash incentive and prepaid return envelope. The survey cover-page identified the affiliations of the investigators and stated that the survey was to be used for research

purposes only. Beneficiaries who did not respond were recontacted by mail up to 2 more times. The second mailing also included a $1 cash incentive. This study was approved by the Brigham and Women's Institutional Review Board.

Survey Instrument

The questionnaire was designed, de novo, to assess patient health beliefs[21] and communication about generic drugs. Using 5-point Likert scales, patients were asked the extent to which they agreed or disagreed with statements about generic medications. The initial questions focused on patients' general perceptions about generic medications by asking if they "would rather take generic than brand name medications." Respondents were then asked the extent to which they agree with statements about the benefits of generic medications, such as, "brand name drugs are more effective than generic drugs"; "generic drugs cause more side effects than brand name drugs"; "generic drugs are less expensive than brand name drugs"; and "generic drugs are a better value than brand name drugs."

Survey respondents were then provided 2 clinical scenarios and asked to report the extent to which they agreed or disagreed with identical (or very similar) statements about their perceptions about generics. The first clinical scenario was a chronic asymptomatic one, hyperlipidemia, and patients were informed that, "For the next set of questions, assume your doctor just told you that you have high cholesterol and need treatment. You will likely need to take a medication for your cholesterol every day for years. To what extent do you agree with the following statements? When treating my high cholesterol …." The second scenario was an acute and symptomatic one, and patients read, "For the next set of questions, assume you have severe back pain and your doctor has prescribed a medication to treat your pain. You will likely need to take a medication for your back pain every day for 2 weeks. To what extent do you agree with the following statements? When treating my back pain …." In each scenario, respondents were asked the extent to which they agreed or disagreed with statements about overall preference for generics as well as perceptions of safety, effectiveness, cost, and value of generics versus branded drugs.

Survey respondents were later asked the extent to which they agree with statements addressing their comfort with generic substitution, such as whether they "feel comfortable" asking their doctor or pharmacist to substitute a generic for a branded medication, or whether they "mind when [their] pharmacist switches [their] prescription to a generic medication." Respondents were also asked the frequency with which they communicate with physicians and pharmacists about generics. The 5-point Likert scale ranged from "never" to "all of the time" for questions about rates of communication.

The questionnaire included sociodemographic characteristics (gender, ethnicity, income, education) as well as self-reported health. The survey instrument was piloted extensively with patients with prescription drug coverage to improve readability and comprehension.

Linkage to Administrative Claims

We linked patient survey responses to information available from patients' enrollment files and claims of prescriptions filled between January 1, 2007 and May 31, 2007. We were provided with individual patient characteristics, characteristics about each individual's benefit design, and aggregate statistics of patients' overall medication use and the proportion of claims filled that were generic (not individual claim data for each respondent). On the third round of survey mailing, a clerical error made it impossible for us to link patient responses to filled prescription data, resulting in missing values for these variables in 76 patients, who were dropped from the analysis.

Measures

The main outcome of interest was the proportion of prescriptions filled that were generic. The outcome variable was defined as the number of prescriptions filled that were generic between January 1, 2007 and May 31, 2007 divided by the total number of prescriptions filled during the time period. We included all medication classes, regardless of the availability of generics for particular medications or within specific drug classes, because generic options are available for most conditions and can be exchanged therapeutically. This outcome does not allow us to account for patients who are appropriately using branded medications because generic medications either failed or were unavailable. Rather, this outcome was selected as a measure of the overall tendency for using generic medications.

Our predictors of interest were scales that represented patients' beliefs and their reported communication with providers about generic drugs. Patient health belief and communication scales were determined from 20 items on the questionnaire that were designed to assess general preference for generics, the benefits of generics versus branded drugs (safety, effectiveness, cost, and value), communication with providers about generic medications and comfort with generic substitution. Scale structure was determined by exploratory factor analysis in LISREL 8.72 (Scientific Software International, Lincolnwood, IL). The main purpose of examining scale structure was to provide evidence that each scale was measuring a single construct with adequate reliability (minimal measurement error). Kaiser-Guttman criterion of eigenvalues ≥1.0, and interpretability were used in deciding upon the number of factors to retain.[22] Factor loadings ≥0.4 were considered important and loadings ≥0.5 significant.[23] Final factor loadings were determined by orthogonal rotation using the normalized Varimax procedure.[24] The internal consistency of each scale was examined using Cronbach's α coefficients.[22,25] Using these methods, 5 multi-item, unidimentional health belief and communication scales emerged:

1. General preferences for generic drugs (3 items, Cronbach's α = 0.86).
2. Perceptions about the safety and effectiveness of generics (6 items, Cronbach's α = 0.87).
3. Generic value and costs (6 items, Cronbach's α = 0.84).
4. Comfort with generic substitution (3 items, Cronbach's α = 0.83).
5. Communication with providers about generics (2 items, Cronbach's α = 0.73).

Detailed methods and results of our factor analysis are available upon request.

We calculated scale scores by summarizing responses to the individual items within respective scales. We then transformed each scale to Z-scores (mean of zero and SD of 1) for ease of interpretation. Each Z-score unit corresponds to a single standard deviation difference in the distribution of responses for each health belief and behavior scale. Within each scale, all items were oriented in the same direction, with higher scores corresponding to more positive views about generics.

Covariates included age, total number of prescriptions filled from January 1, 2007 to May 31, 2007 (as a marker of prescription drug use), and pharmacy benefit design obtained through data linkage with patients' pharmacy benefit enrollment and claim files. We also adjusted for self-reported sociodemographic factors (gender, ethnicity, income, education), and health status that were collected from questionnaires. We developed an independent variable that described the generosity of the prescription drug benefit. To create this variable, we calculated the difference in copayment for generic and preferred branded medications for each patient, and grouped them into tertiles. We included both benefit structure and generosity of coverage in adjusted models to thoroughly control for relationships between out-of-pocket cost requirements and our outcomes of interest. We aimed to control for any factors that might be

associated with plan selection that may also have been associated with our outcome of interest to minimize selection bias.

Data Analysis

We used descriptive statistics to examine characteristics of the respondents. We examined the association between patient health beliefs and communication about generics and the proportion of prescriptions filled that were generic using linear regression. Missing independent variables in multivariable models were handled using multiple imputation[26]; all independent variables had less than 10% missing values. To account for heteroskedasticity in the regression error term, we estimated robust standard errors using the Huber-White approach. We conducted adjusted regression models with each health belief and communication scale independently, and then conducted a single, fully adjusted multivariable model that included all 5 scales at the same time. Statistical analyses were performed using SAS 9.1 software (Cary, NC); we evaluated the association between each standard deviation increase in a patients' health belief or communication scales on the proportion of generics received by the patient.

RESULTS

Of the 2500 beneficiaries who were mailed surveys, 1054 responded. Six responses were duplicates (patients who had responded, were mailed another survey, and responded to the next survey as well). We only included the first response for each respondent, with an overall response rate of 42%. One survey response was unusable. An additional 298 addresses were identified as incorrect because the mailed surveys were returned to sender. After removing incorrect addresses from the denominator, our response rate among correct addresses was 48% (1047 respondents/2202 correct addresses surveyed). After dropping patients for whom the outcome variable was missing, we included 971 patients in the analysis.

Sample

The average age of patients in our sample was 51.6, one-third were male, and most described themselves as Caucasian/white. A broad range of education-level, total household income, and self-described general health was represented. Respondents were generally older than nonrespondents, but respondents and nonrespondents were enrolled in similar pharmacy benefit designs, used prescription drugs with a similar frequency and used a similar proportion of generic drugs (Table 1).

On average, respondents filled 11.6 prescriptions between January 1, 2007 and May 31, 2007. Of the total number of prescriptions filled, 61.6% were for generic medications. Responses to survey items and descriptive statistics of health belief and communication scale scores are presented in Table 2.

Relationship Between Beliefs and Generic Drug Use

First, we constructed 5 separate multivariable linear regression models, including 1 health belief and communication scale at a time, to assess the relationship between each scale and the proportion of prescriptions filled that were generic. After controlling for patient age, self-reported health status, education, income, ethnicity, pharmacy benefit design, and benefit generosity, we found a significant relationship between patients' generic drug use and all 5 health belief and communication scales (Table 3). Each standard deviation increase in the scale measuring general beliefs about generic drugs was associated with a 3.1% increase in generic drug use ($P = 0.049$). Each standard deviation increase in the scale describing patient beliefs about generic drug safety and effectiveness was associated with a 4.3% increase in generic drug use ($P = 0.006$), whereas a standard deviation increase in beliefs about generic drug value was associated with a 3.3% increase in generic use ($P = 0.044$).

Every standard deviation increase in the scale describing patients' comfort with generic substitution was associated with a 6.3% increase in generic drug use ($P < 0.001$). Similarly, patients who reported that they talk to their physicians about generic drug substitution were more likely to fill generic medications than patients who did not; each standard deviation increase was associated with a 5.3% increase in generic drug use ($P < 0.001$).

Fully Adjusted Model

When all 5 health belief and communication scales were included in a single, fully adjusted model, 2 scales were significantly associated with generic drug use. One standard deviation increase in the scale describing comfort with generic substitution was associated with a 4.9% increase in generic medication use ($P = 0.021$). Likewise, 1 standard deviation increase in scale measuring communication with doctors or pharmacists about generic drugs was associated with a 3.9% increase in generic drug use ($P = 0.012$). General preference for generic drugs, perceptions about generic safety and efficacy, and perceptions about generic drug value were no longer significant in the fully adjusted model (Table 4).

DISCUSSION

To our knowledge, this is the first study to link patient beliefs or communication about generic drugs with actual medication use, offering payors and policymakers insight into the expected benefits of educational campaigns to influence such perceptions. We found that health beliefs about generic drugs across a number of domains were associated with generic use. When evaluated individually, more positive responses in all domains of beliefs and communication about generics (general perceptions, generic safety/efficacy, generic value, comfort with generic substitution, and communicating with providers) were associated with greater generic drug use. However, after fully adjusting for all of these beliefs and communication, it was only the most actionable items—talking with providers about generics and comfort with generic substitution—that maintained significant relationships with actual generic drug use.

Empirical data is needed to guide the development of strategies to improve rational and cost-effective prescribing. Although numerous studies demonstrate that communication between patients and both pharmacists and physicians about new prescriptions written are incomplete[27,28] and cost is rarely communicated,[29–31] our results suggest that patients most comfortable with generic substitution and who communicate with providers about generics are more likely to use generics. Simply holding positive preferences for generic medications may exert little influence on the prescribing process. If insurers or policymakers hope to increase generic drug use, educational campaigns may be most effective if they concentrate on these 2 loci in which patients can most directly influence the medication they receive.

We are unable to definitively discriminate whether more positive beliefs and communication about generic drug use cause increased generic drug use, or whether patients who use more generics tend to have more positive views about them. However, if even part of the relationship between beliefs and actual use is causal, then educational campaigns that affect preferences or communication about generics would have a meaningful influence on drug use and overall drug spending. Recent estimates indicate that every 1% increase in generic drug use would reduce overall spending on prescription drugs in the United States by $4 billion annually.[32] An educational campaign targeted at improving communication with providers about generics or comfort with generic substitution could reduce overall drug spending by billions of dollars annually in the United States if it even modestly affects generic drug use. As an important national purchaser of prescription drugs, Medicare may consider educating seniors about these issues.

Such educational interventions may also improve adherence to chronic medications. Most patients in the United States are enrolled in tiered benefit plans that charge greater copayments for branded drugs[33] and recent findings suggest that patients enrolled in tiered benefit plans are most adherent to chronic medications when prescribed generic medications.[34]

To perform this analysis, we created a unique data set that linked beliefs to actual medication use. Few opportunities to examine the relationship between beliefs and actual medication use exist, and have been focused on understanding how patient requests for antibiotics or advertised medications affect prescribing behavior.[35,36] Research designs such as ours may be useful as we evaluate the effects of prescription drug policies on medication use. Including beliefs and communication in models assessing medication use can help to clarify policy solutions to optimize the value of prescription drug care. Moreover, such designs may reveal unforeseen obstacles in policy development.

In the adjusted models, patient-level characteristics had less influence on generic drug use than seen in previous studies.[14,15] However, previous studies did not account for patient beliefs or communication. Correlations have previously been reported between patient sociodemographic characteristics and preferences.[37] The relationships identified in previous studies between patient characteristics and generic drug use were likely mediated by beliefs and communication with providers about generic drugs. In our adjusted analyses, few patient-level characteristics were significantly associated with generic drug use after controlling for patient-level beliefs and communication.

The response rate for this survey was less than 50%, although measured characteristics of respondents and nonrespondents were similar. Nonetheless, caution is warranted when generalizing these findings more broadly. In addition, we sampled only commercially-insured patients with pharmacy benefit coverage, and cannot comment on patients who either have no coverage or state- or federally-sponsored coverage.

Our outcome variable was influenced by drug mix. Patients may have had low generic fill rates because they were using single-source branded medications where no generic alternative was available. That said, the overall percentage of generic drug use in this sample was greater than 60%, consistent with national estimates.[38] In another study evaluating the population from which our sample was randomly selected, the majority of branded drug use occurred in classes where generics were available (eg, statins or antihypertensives) and therapeutic interchange for a generic was a possibility.[38] Nonetheless, if patients with specific characteristics and beliefs tended to fill only single-source medications with no generic therapeutic alternative, this could have introduced bias into our design. Including classes of medications with no generic alternative likely led to conservative estimates of the strength of relationship between beliefs about generics and actual generic drug use.

We did not account for days supply of prescriptions filled when calculating our outcome variable. We did not have access to this variable in our analytic dataset. Although we do not expect this to have introduced significant bias into our analysis, we may have missed an opportunity to explore whether use of mail-order pharmacies, which generally provide 3-month supplies, mediate some of the differences seen in generic fill rates in patients with varying beliefs and communication about generic drugs.

In addition, the strength of the relationship between general preferences for generics may have been moderated in our fully adjusted model by collinearity of predictor variables. However, unidimensional scales were identified using exploratory factor analysis, limiting the extent of collinearity between the factors. Additionally, we found stronger relationships between the 2 factors found to remain significant in the fully adjusted model than the other factors when factors were evaluated individually.

These findings point to strategies which health plans or policymakers may choose to educate patients about features of the process of choosing and filling prescriptions when trying to encourage rational medication use. In our consumer-driven healthcare system, patients and doctors frequently have difficulty navigating complex benefit designs and identifying the most cost-effective options.[31,39] Educational campaigns that focus on enhancing the frequency that patients talk to their physicians and pharmacists about generic medications, and improve comfort with those discussions, may meaningfully influence generic drug use. Similarly, interventions that provide accessible information about generic options for patients' medical conditions, increase opportunities for generic substitution, and that demystify the generic substitution process may be influential. Although there is little existing evidence to guide the development of such interventions, efforts to empower patients to actively participate in the medication selection process may have the greatest effect on actual drug use.

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TABLE 1

Characteristics of Survey Respondents and Nonrespondents

	Respondents N (% or Mean ± SD)	Nonrespondents N (% or Mean ± SD)	Difference *P*
	Total N = 971	Total N = 1326	
Age, mean (SD)	51.6 (±15.4)	45.9 (±15.5)	<0.001
Gender, female	706 (67.4)	NA	
Education			
High school or less	245 (23.4)	NA	
Some college	295 (28.2)		
College graduate	317 (30.3)		
Graduate school	190 (18.2)		
Race			
African American	55 (5.3)	NA	
Hispanic	42 (4.0)		
Asian/Pacific Islander	31 (3.0)		
White	904 (86.3)		
Other	15 (1.4)		
Total household income			
<$15,000	46 (4.4)	NA	
$15,000–$30,000	140 (13.4)		
$30,000–$50,000	266 (25.4)		
$50,000–$75,000	245 (23.4)		
$75,000–$100,000	178 (17.0)		
>$100,000	172 (16.4)		
Self-described general health status			
Excellent	106 (10.1)	NA	
Very good	410 (39.2)		
Good	354 (33.8)		
Fair	142 (13.6)		
Poor	35 (3.3)		
Total number of prescriptions per patient from 1/1/07–5/31/07	11.6 (±10.3)	11.0 (±10.3)	0.18
Proportion of prescriptions filled that were generic	61.7 (±30.7)	61.3 (±32.9)	0.52
Drug insurance type			0.25
1-tier	23 (2.4)	39 (2.9)	
2-tier	75 (7.7)	120 (9.1)	
3-tier	546 (56.2)	762 (57.5)	
Non-tiered co-insurance	85 (8.8)	84 (6.3)	
Tiered co-insurance	136 (14.0)	183 (13.8)	
Other	106 (10.9)	138 (10.4)	

TABLE 2

Descriptive Statistics for Health Belief and Behavior Scales and Individual Item Responses*

	Mean (SD)
Preferences for generic drugs	3.16 (1.05)
I would rather take generic than brand name medications[a,†]	3.20 (1.15)
I would rather take generic than brand name medications[b,†]	3.17 (1.22)
I would rather take generic than brand name medications[c,†]	3.15 (1.19)
Generic benefits—safety/effectiveness	2.67 (0.80)
Brand name drugs are more effective than generic drugs[a,†]	2.82 (1.18)
Generic drugs cause more side effects than brand name drug[a,†]	2.50 (0.98)
A brand name drug would be more effective than a generic drug[b,†]	2.84 (1.08)
A generic drug would cause worse side effects than a brand name drug[b,†]	2.50 (0.94)
A brand name drug would be more effective than a generic drug[c,†]	2.87 (1.06)
A generic drug would cause worse side effects than a brand name[c,†]	2.52 (0.92)
Generics benefits—costs	4.22 (0.71)
Generic drugs are less expensive than brand name drugs[a,†]	4.58 (0.80)
Generic drugs are a better value than brand name drugs[a,†]	3.99 (1.11)
A generic drug would be less expensive than a brand name drug[b,†]	4.46 (0.77)
A generic drug would be a better value than a brand name drug[b,†]	3.95 (1.06)
A generic drug would be less expensive than a brand name drug[c,†]	4.45 (0.80)
A generic drug would be a better value than a brand name drug[c,†]	3.98 (1.05)
Comfort with generic substitution	3.66 (1.16)
I feel comfortable asking my doctor to substitute a generic form of a brand name medication[d,†]	3.84 (1.19)
I feel comfortable asking my pharmacist to substitute a generic form of a brand name medication[d,†]	3.69 (1.29)
I don't mind when my pharmacist switches my prescription to a generic medication[d,†]	3.47 (1.51)
Communication with providers about generics	2.46 (1.12)
My doctor talks to me about generic medications[e,‡]	2.41 (1.21)
My pharmacist talks to me about generic medications[e,‡]	2.51 (1.31)

*Responses to all questions were oriented so that greater responses indicate more favorable perceptions of generics.

†Question stems:

[a]General: The following questions explore your beliefs about generic and brand name medications. To what extent do you agree or disagree with the following statements?

[b]Chronic: For the next set of questions, assume your doctor just told you that you have high cholesterol and need treatment. You will likely need to take a medication for your cholesterol every day for years. To what extent do you agree with the following statements? When treating my high cholesterol ….

[c]For the next set of questions, assume you have severe back pain and your doctor has prescribed a medication to treat your pain. You will likely need to take a medication for your back pain every day for 2 weeks. To what extent do you agree with the following statements? When treating my back pain ….

[d]Please indicate how often the following occurs when you receive a new prescription from your doctor or fill a prescription at the pharmacy ….

[e]To what extent do you agree with the following statements?

‡Response options: 1. strongly disagree; 2. somewhat disagree; 3. neither agree nor disagree; 4. somewhat agree; 5. strongly agree.

≠Response options: 1. never; 2. seldom; 3. some of the time; 4. most of the time; 5. all of the time.

TABLE 3

Results of 5 Adjusted Linear Regression Models Evaluating the Relationship Between Each Health Belief and Behavior Scale and the Percentage of Prescriptions Filled That Were Generic

Factors Representing Preferences or Beliefs About Generics	General Preferences for Generic Drugs	Perceptions About Generic Safety/ Efficacy	Perceptions About Generic Costs and Value	Comfort With Generic Substitution	Communication With Providers About Generics
Parameter estimate (*P* value)	0.031 (0.049)*	0.043 (0.006)†	0.033 (0.044)*	0.063 (0.0001)‡	0.052 (0.001)‡

Each model controls for patient for age, gender, self-described health, income, education, benefit design, and benefit generosity. Parameter estimates reflect the increase in the proportion of generics used for each standard deviation increase in response for each factor. Higher scores in each factor indicate more positive views regarding the factor domain.

*$P < 0.05$

†$P < 0.01$

‡$P < 0.001$.

TABLE 4

Fully Adjusted Linear Regression Model Evaluating the Relationship Between, Patient Characteristics, All 5 Health Belief and Behavior Scales, and Proportion of Prescriptions Filled as Generic

Fully Adjusted Model:* **Including All 5 Factors**	**Estimate**	**95% Confidence Limits**		**Pr > |Z|**
Age, yrs (vs. <40)				
40–55	−0.063	−0.148	0.023	0.153
56–64	−0.079	−0.165	0.008	0.075
>65	−0.130	−0.226	−0.035	0.008†
Gender, female (vs. male)	−0.035	−0.104	0.035	0.326
Education (vs. high school or less)				
Some college	0.038	−0.040	0.116	0.343
College graduate	−0.049	−0.135	0.038	0.272
Graduate school	0.007	−0.093	0.106	0.897
Race (vs. white)				
African American	−0.089	−0.250	0.072	0.278
Hispanic	0.056	−0.094	0.206	0.462
Asian/Pacific Islander	−0.055	−0.308	0.198	0.670
Other	0.071	−0.035	0.177	0.189
Total household income (vs. <$30,000)				
$30,000–$75,000	−0.074	−0.147	−0.002	0.044†
>$75,000	−0.192	−0.285	−0.100	<0.0001†
Self-described general health status (vs. fair/ poor)				
Good	0.008	−0.072	0.087	0.852
Very good	0.008	−0.080	0.095	0.865
Excellent	−0.072	−0.220	0.077	0.345
No. prescriptions filled from 1/1/07–5/31/07	−0.0003	−0.003	0.003	0.866
Factors representing references or beliefs about generics				
General preferences for generic drugs	−0.023	−0.059	0.014	0.230
Perceptions about generic safety/efficacy	0.028	−0.006	0.061	0.106
Perceptions about generics costs and value	0.001	−0.034	0.037	0.948
Comfort with generic substitution	0.049	0.007	0.091	0.021†
Communicating about generics with providers	0.038	0.009	0.068	0.012†

*Controlling for benefit design and generosity of coverage.

†$P < 0.05$.