

The impact of insurance coverage on consumer utilization of health services

An exploratory study

Genevieve Elizabeth O'Connor

*Department of Marketing, School of Business, Fordham University,
New York, New York, USA*

Abstract

Purpose – The purpose of this paper is to identify how need for service, enabling factors and pre-disposing characteristics influences access to service. In addition, the authors seek to examine the moderating influence of pre-disposing variables on the relationship between insurance and health services utilization.

Design/methodology/approach – The authors utilize data from a major metropolitan hospital in the USA to test and extend the behavioral model of health care.

Findings – Results indicate that insurance and pre-disposing variables have a direct impact on type of health service utilization. However, the insurance effect is found to vary by demographic factors.

Research limitations/implications – This paper is limited to secondary data. Future work can incorporate both attitudinal and behavioral measures to obtain a more comprehensive evaluation of services access.

Practical implications – The research offers a tactical framework for management to segment consumer markets more effectively.

Social implications – Through the framework, management will have the requisite knowledge to target segmented populations based on need, insurance, and pre-disposing variables which will help improve access to services and clinical outcome.

Originality/value – The findings of this paper will serve as a basis for future research exploring the influence of insurance on access to services.

Keywords Marketing, Insurance, Market segmentation, Services

Paper type Research paper

Introduction

Although the USA has witnessed drastic improvements in its overall health, great disparities exist among the population in regards to access to health care services. Access to health care services is defined as the personal use of medical care services and everything that enables or hinders their use (Andreson *et al.*, 2013). Individuals who are underutilizing or even over utilizing health care services present considerable challenges to health care policymakers and other health care customers. A health care customer's failure to access a needed service may lead to an increased risk for morbidity and emergency room visits (Deyo and Inui, 1980; Mitchell and Selmes, 2007). In contrast, when a health care customer over utilizes a service, they incur unnecessary costs (Korenstein *et al.*, 2012). By and large, these disparities in access can affect lives and dollars. Recognizing and addressing this challenge affords management and marketers alike the opportunity to positively influence change and improve health care customers' outcomes.

There is a plethora of research that investigates access to health care services. However, the bulk of this research is limited to attitudes and perceptions; behavioral



mechanisms have been largely overlooked. Further, use of existing theories in health behavior research is relatively limited. In a systematic review of the health behavior literature, Painter *et al.* (2008) found that theory was predominantly used to inform studies (68 percent). Further, Painter *et al.* (2008) found that very little research applies (18 percent), tests (4 percent) and builds theory (9 percent). By applying models of health service use, researchers can help better identify challenges related to access, as well as gain insights into maintaining and improving overall health (Gelberg *et al.*, 2000). To help fill this gap in health behavior research and to help move the field forward, I apply the behavioral model of health service use (Andersen, 1968, 1995) to identify and address barriers related to health service access.

A seminal model for analyzing health service usage, Andersen's (1968, 1995) behavioral model of health service use is one of the most widely used frameworks to understand drivers of health care utilization (Davidson *et al.*, 2004). The behavioral model maintains that there are three primary drivers of health service usage; need, enabling factors, and pre-disposing characteristics (Andersen, 1968, 1995).

Before a customer utilizes a service, there is a need for the service. This need is typically expressed as a customer's health status (Babitsch *et al.*, 2012). Customer's scheduling primary care appointments are generally in better health than customer's scheduling specialty appointments (Starfield *et al.*, 2005). Intuitively, the greater the need for a service, the greater the likelihood a customer will use that service. As preventive care services are used to stave off or monitor conditions, I believe healthier health care customers (i.e. primary care patients) will have a greater need for preventive services than patients seeking specialty care.

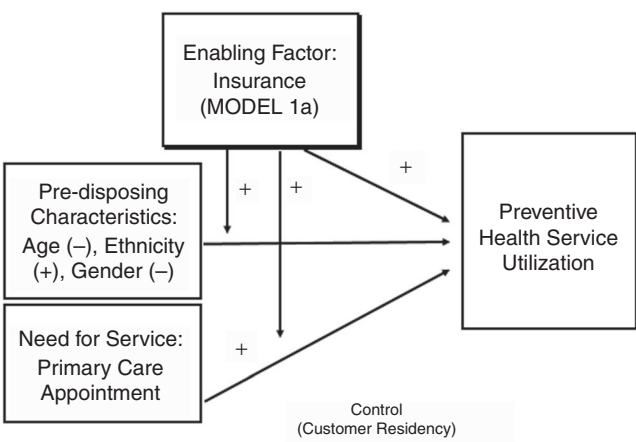
Enabling factors are considered the necessary resources (i.e. capital) the customer must possess in order to attain the selected service (Andersen, 1968, 1995). They are the extrinsic factors that facilitate a customer to access services with a service provider. Health insurance coverage status, as an enabling factor, is frequently used as a measure to gauge a customer's ability to gain access to care (Zuckerman *et al.*, 2004) and is positively related to health service utilization (Sudano and Baker, 2003). In addition, the customer's type of insurance coverage has been found to influence service utilization. Case in point, Gooding *et al.* (1996) found that health care customers insured by Medicaid have higher rates of inappropriate service usage than customers covered by Health Maintenance Organizations (HMOs).

The third component of the behavioral model is pre-disposing characteristics. Andersen (1968, 1995) defines pre-disposing characteristics as immutable customer characteristics (i.e. age, gender, and race). Numerous studies have found that each of these characteristics plays a role in a customer's ability to access services (Babitsch *et al.*, 2012).

Research has found that service access varies by age, gender, and ethnicity (Hayward *et al.*, 1998; Lasser *et al.*, 2006). Therefore, I expect that the effect of insurance coverage and type of insurance coverage will vary across different socio-demographic groups. I seek to extend the existing framework by testing the moderating effect of enabling factors (i.e. insurance coverage and type of insurance) on pre-disposing characteristics (i.e. age, gender, and ethnicity).

As depicted in Figure 1 (Model 1a), I use the behavioral model of health service utilization as the foundation for my analytical framework. I examine how a health care customer's need for service (degree of service demand based on appointment category), enabling factors (circumstances that facilitate usage), and pre-disposing characteristics (individual demographic characteristics that cannot be changed) drive preventive health service utilization. I further examine how the relationship between pre-disposing

Figure 1.
Conceptual
framework for
Model 1a

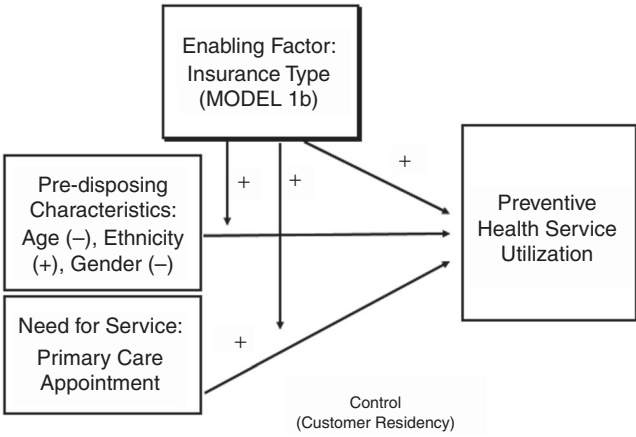


characteristics (e.g. age, gender, and ethnicity) and preventive health service utilization is moderated by enabling factors (e.g. insurance coverage and insurance type).

The behavioral model of health service utilization is applied in another specification of the model (see Figure 2, Model 1b). To better understand how type of insurance coverage held influences preventive health service utilization, I replace insurance coverage (Model 1a) with insurance coverage type (Model 1b). Insurance coverage type refers to insurance plans that qualify as either government sponsored or private insurance plans. The remaining aforementioned variables in the initial specification of the model are included in the model.

Through this work I hope to afford management and policymakers tactical tools to diminish disparities related to service access. This research offers a practical framework for management to segment consumer groups to improve access to care and ultimately customer outcome. Research has shown that market segments are usually selected from four general areas; geographic, demographic, psychographic, and behavioral characteristics (Patsiotis *et al.*, 2012). Our research offers management the opportunity to segment the market in this manner by offering a variety of criteria such

Figure 2.
Conceptual
framework for
Model 1b



as age, gender, ethnicity, the category of appointment scheduled, insurance coverage status and insurance type. In addition, by recognizing the heterogeneity across different groups, management will have the power to customize market development programs and their overall strategy (Jamal and Naser, 2002).

This research offers three major contributions to academia. First, this study extends the behavioral model of health services framework by examining the moderating effect of insurance coverage and insurance type on the relationship between health service utilization and pre-disposing characteristics. Second, this study extends research surrounding access to care by partitioning health service utilization into preventive care and acute care. Finally less has been written on the role insurance plays in access to services (Robson and Sekhon, 2011). Through this research, I help fill the gap in insurance literature.

Proprietary data from a major metropolitan health care system in the northeast region of the USA is used to explore the role of need for care, enabling factors and predisposing characteristics on preventive health service utilization. The health care system offers an array of diagnostic and treatment services to a diverse mix of approximately 500,000 urban and suburban patients in an outpatient setting. The results show that preventive health service utilization is influenced by category of appointment, insurance coverage and type, and demographic variables. Of key interest is the finding that the degree to which insurance coverage matters and type of insurance held is varied among different demographic cohorts. I conclude by offering implication for policymakers and marketers.

Theoretical development

Service usage is detrimentally affected by barriers to access. Of particular interest is the finding that preventive care in the USA is highly underutilized; with usage at about half of the recommended rate (McGlynn *et al.*, 2003). Janz and Becker (1984) found that health care customers are influenced by a variety of factors regarding taking preventive action to reduce the risk of disease or even comply with prescribed medical regimens. Although numerous models and theories, such as the health belief model (Rosenstock, 1974; Becker *et al.*, 1977; Janz and Becker, 1984), theory of reasoned action/planned behavior (Ajzen and Fishbein, 1980), social cognitive theory (Bandura, 1998), and the transtheoretical model (Mittler *et al.*, 2013) have been used to better understand health service utilization, these frameworks have primarily been applied to capture health care customer attitudes and perceptions regarding their health care. I hope to extend the literature by exploring customers' behavior, specifically in the presence of modifying variables, by examining their actual decisions through an application of the behavioral model of health service utilization.

I apply the behavioral model to examine types of health care customer appointments scheduled over the course of one year in a major metropolitan hospital in the USA. Based on a review of the literature, I conceptualize the effects of need for service as department category (e.g. primary care appointment or specialty care appointment), enabling factors as insurance (e.g. insurance coverage status) and insurance type (e.g. private insurance or government insurance) and pre-disposing characteristics such as gender, age and ethnicity (e.g. white or nonwhite). A detailed description of the model and hypotheses are described as follows.

Preventive health service utilization

Rather than merely evaluate total health services utilization, I believe it is important to partition health service utilization into groups based on a patient's motivation for a

health care appointment. A patient who schedules their routine (preventive) medical exam has a different motivation than a patient who schedules a one-off medical procedure. Preventive health services are defined as health care services that are designed to reduce the likelihood of disease or illness. Common examples include services such as immunizations, counseling, and screening tests. Although the use of preventive health care has been shown to improve health outcomes and save money (Cohen *et al.*, 2008), only a portion of Americans actually receive preventive care (Maciosek *et al.*, 2010). I am confident that this research offers a framework for organizations to improve access to preventive services and ultimately improve customer outcomes. Therefore, I examine health care utilization through the lens of preventive care appointments compared to acute care appointments.

Based on the behavioral model of health services framework, I believe circumstances exist which affect a patient's ability to gain access to services. Therefore I examine the three main drivers of health service utilization below.

Need for service

The ability to attain services is affected by the degree of need for a service. Gelberg *et al.* (2000) found that the greater the perceived or actual need for a service, the greater the use of health care services. Specifically, the type of health care provider (e.g. primary care provider or specialty provider) that health care customers schedule their services with is likely to be linked to the patient's perceived threat of illness. Specialty services, each derived from a different division of medicine, are designed to deliver specific, often complex, diagnoses, and treatments (Gupta and Denton, 2008). Specialty appointments are primarily scheduled for a need the primary care provider cannot meet. Further, it is important to note that although some specialty appointments are customer initiated, the vast majority of specialty care is driven by a referral from the health care customer's primary care physician (PCP).

A health care customers' PCP is commonly seen as the gatekeeper of the health delivery system. They are usually the first point of contact for a patient. In addition to providing diagnoses, treatments, and making referrals for specialty visits, PCPs are responsible for conducting health screenings, conducting comprehensive physical exams, and providing primary, wellness and preventative health services. As PCP's are primarily responsible for engaging patients in preventive health care, the likelihood of scheduling preventive appointments compared to acute appointments will likely be higher for primary care patients. Thus, I posit:

- H1.* A health care customer who schedules a primary care appointment is more likely to utilize preventive health services than a health care customer who schedules a specialty appointment.

Enabling factors

Service usage is influenced by resources that facilitate adoption (Püschel *et al.*, 2010). A critical enabling factor for access to health care is medical insurance coverage (Zuvekas and Taliaferro, 2003). However, unlike carriers of home insurance, auto insurance, and especially life insurance policies, carriers of medical insurance may have cause to want to utilize services and interact with their providers. Research has found that other insurance carriers rarely interact with their providers and prefer to not fully utilize the product (Gidhagen and Persson, 2011). In contrast, customers who carry health insurance have the opportunity to enhance their lives by utilizing preventive services through insurance coverage. Therefore I believe insurance coverage will serve as an enabler to service access and help promote preventive service usage.

On the other hand, due to the sheer cost of care, individuals without health insurance are less likely to use medical services (Currie and Gruber, 1996). Unless patients receive charity care, uninsured individuals generally have a greater financial responsibility to their health care provider than insured individuals. Further, certain providers may deny access to patients based on lack of insurance coverage alone.

Previous research has found that uninsured health care customers receive less preventive and acute services than health care customers who are insured (Thorpe, 2004) and are at the greatest risk for increased mortality (Hadley *et al.*, 1991). Therefore, I believe uninsured health care customers are more likely to schedule appointments that are considered urgent in nature; specifically where the perceived or actual need is greater. Specifically, I expect the likelihood of scheduling a preventive care appointment (compared to an acute care appointment) will be lower for uninsured health care customers than it is for insured health care customers. Thus, I posit:

H2a. A health care customer who is covered by health insurance is more likely to utilize preventive health services than a health care customer who does not have health insurance.

To further investigate the effect of having insurance coverage on preventive health service utilization I partition insured health care consumers into two groups; government coverage or private coverage. This distinction is based on how US citizens respond to the Current Population Survey Annual Social and Economic Supplement (CPS ASEC). Following guidelines outlined by the CPS ASEC, government health insurance programs include Medicare, Medicaid, and other federal programs (e.g. military, etc.). It is important to note that unlike private insurance, individuals need to qualify for these government programs based on various criteria such as disability, age, income and type of employment. Private health insurance plans are generally offered to the public either through employers or by private acquisition. They include any type of fee for service or managed care plan that is provided by a private company. These plans include HMO, Preferred Provider Organization (PPO), and Point of Service (POS) Insurance.

I expect to find differences in usage among the two groups due to the different financial responsibilities regarding payment of care and eligibility for care. When considering the varying effects of insurance types, I expect privately insured customers may be more apt to utilize preventive health services as private plans tend to be less restrictive in nature (i.e. eligibility is not typically determined by disability, age, income, and type of employment). Thus, I posit:

H2b. A health care customer who is covered by a private health insurance plan is more likely to utilize preventive health services than a health care customer who is covered by a government sponsored plan.

Pre-disposing characteristics

Lee *et al.*'s (2005) research on service usage in the banking industry found that in order to truly understand service usage it is important to identify differences among and between adopters of a service and nonadopters of a service. Similarly, I seek to demonstrate how preventive service usage varies across different demographic cohorts (e.g. age, gender, and ethnicity). Certain groups of individuals may be more prone to adopt a service based on pre-disposing characteristics (Yousafzai and Yani-de-Soriano, 2012). In terms of health care services, demographic factors play a considerable role in patient's access to care (Zuvekas and Taliaferro, 2003). Numerous studies have found that in addition to insurance coverage, factors such as age, ethnicity, and gender

(Hayward *et al.*, 1998; Lasser *et al.*, 2006) have a direct influence on a patient's access to care. Specifically, racial, and ethnic minorities have been found to face greater barriers to access care than their counterparts (Shi, 1999; Shi and Stevens, 2005). Research has found that whites are more apt to use preventive care (Solis *et al.*, 1990). Regarding gender, females have traditionally been found to use more medical services (Coustasse *et al.*, 2008) and are more likely to schedule preventive care services (Bertakis *et al.*, 2000). Finally, according to a report published by the Center of Disease Control (2011) many preventive services are highly underutilized by older adults (65 years and older). According to the report, adults aged 65 and older receive fewer preventive treatment options and reduced access to care. Based on the discussion above, significant variation can be expected among different groups and their usage of preventive services. Thus, I propose:

- H3a.* For each additional year in age, the likelihood of using preventive services will decrease.
- H3b.* A female health care customer is more likely to utilize preventive health services than a male health care customer.
- H3c.* A white health care customer is more likely to utilize preventive health services than a nonwhite health care customer.

Interaction between enabling factors and pre-disposing characteristics

The presence of insurance has routinely been found to influence care. However, the degree to which insurance coverage matters is varied. Minorities are less likely to have insurance coverage or use preventive or routine care compared to whites (Zuvekas and Taliaferro, 2003). According to a report by the Kaiser Foundation, women are less likely than men to be insured (Kaiser, 2014). Regarding age, individuals automatically qualify for Medicare at the age of 65. Further, according to the 2012 Census, older adults (ages 35-64) are more apt to have insurance coverage than younger adults (aged 19-34) (DeNavas-Walt *et al.*, 2013). Based on the discussions above, I expect that preventive health service utilization, with respect to appointment making behavior, will vary across demographic groups and be affected by the presence or absence of insurance coverage and whether the patient was covered by a private or government sponsored insurance plan. Thus, I propose:

- H4a.* The effect of pre-disposing characteristics (e.g. age, gender, and ethnicity) on future preventive service utilization will vary by customers who have insurance compared to customers who do not have insurance.
- H4b.* The effect of pre-disposing characteristics (e.g. age, gender, and ethnicity) on future preventive service utilization will vary by customers who have private health insurance compared to customers who have government sponsored insurance.

Empirical investigation

The proposed relationships are conceptualized in one model with two specifications. To examine the effects of need for service (i.e. primary care appointment vs specialty care appointment), insurance coverage status, age, ethnicity, and gender on preventive health service utilization I examine 112,672 appointments between hospital providers and health care customers (Figure 1). In Model 1b (Figure 2) the same relationships are tested except I limit the analysis of service utilization to patients who have insurance. Therefore, I examine 110,399 appointments to compare the effects of need for service,

insurance type and demographic covariates on preventive health service utilization. The unit of analysis in both models is the health care customer's appointment with a provider. Hospital billing records from April 1, 2010 to March 31, 2011 are used to explore the aforementioned relationships.

Measurement of the dependent variable

The dependent variable is the type of preventive health service scheduled; preventive health service utilization (acute care appointment = 0, preventive service appointment = 1). Acute care appointments serve as the reference category for the model and are defined as appointments that are more urgent in nature such as procedures and sick visits. Preventive service appointments are described as a patient's annual exam (well visits), monitoring (e.g. blood pressure check) or educational visits (e.g. insulin instruction). A detailed description of appointments that qualify as acute and preventive care appointments is available from the authors.

Measurement of the independent variables

Continuous and dummy variables are operationalized to predict the likelihood of scheduling a preventive service appointment.

Need for service

Need for service is operationalized by a health care customer's degree of need for an appointment (Appointment Category). Need for service is a dichotomous dummy variable and is coded as primary care appointment (1) or specialty care appointment (0).

Enabling factor

Insurance is a dichotomous dummy variable and is coded as insured (1) or uninsured (0). Type of insurance (Insurance Type) is a dichotomous dummy variable and is coded as private insurance (1) or government insurance (0).

Pre-disposing characteristics

Age at appointment is treated as a continuous variable and is calculated in years as the difference between the patient's date of birth and date of appointment. Extreme outliers, age 121 and 122 years are re-coded as missing. Gender is treated as a dichotomous variable and dummy coded as male (1) or female (0). Ethnicity is treated as a polytomous dummy variable and is classified as white (1) or nonwhite (0). Declined to answer is treated as missing.

Interaction variables

To detect differences of preventive service utilization between whites and nonwhites, males and females and across age groups in the presence of insurance coverage (as compared to no coverage) I included interaction terms between pre-disposing variables and insurance. In Model 1a (Figure 1) the interaction terms are: Insurance \times Age, Insurance \times Gender, and Insurance \times Ethnicity. In the second specification of the model (Figure 2) I examine disparities of preventive service usage among the different demographics in the presence of private insurance (compared to government insurance). The interaction terms are: Insurance type \times Age, Insurance type \times Gender, and Insurance type \times Ethnicity.

Measurement of control variables

In terms of location, geographical proximity has been found to influence access to services (Beck *et al.*, 2007). The closer the patient is to the service facility, the more likely they are to utilize the service (Padgett and Brodsky, 1992). This pre-disposing factor is controlled for in the model. Geographical residency (Residency) is a dichotomous variable and dummy coded as in state resident (1) or out of state resident (0). Residencies outside the USA are treated as missing.

This proprietary data set includes a large heterogeneous population that has appointments in both urban and suburban residencies. Due to the diverse population studied, and the broad applicability of the framework, the results will likely be generalizable to other service industries.

Research methodology

Basic descriptive analysis and multivariate regression analyses are conducted to study the relationships between need for service, enabling factors, and pre-disposing characteristics related to preventive health service utilization. Logistic regression is used to estimate the effects of the explanatory variables on the probability of scheduling a preventive health service appointment. The unit of analysis is the individual health care customer's appointment with the provider and a logistic regression model is used to test the relationships. Logistic regression is an appropriate model to test the relationships as the dependent variable, preventive health service utilization, is a binary dependent variable. Using logistic regression, I estimate a model of preventive health service utilization for the total sample of 112,672 scheduled appointments (Model 1a) and for the total sample of 110,399 scheduled appointments (Model 1b). In the logistic regression analysis the data are arranged so that there is one observation for each scheduled appointment. This model expresses the probability of scheduling a preventive health service appointment as a function of a series of explanatory variables. The model can be expressed as follows:

$$E\{Y_i\} = \exp(X'_i\beta) / 1 + \exp(X'_i\beta)$$

where Y denotes preventive health service utilization, X is the vector of independent variables and E stands for the likelihood of choosing one of the response outcomes (preventive care appointment or acute care appointment). Subscript i refers to the i th appointment (X_i , Y_i) (Kutner *et al.*, 2005). Logistic transformation applied to this model bounds the value of the dependent variable by 0 and 1, and the coefficient estimates for the independent variables represent the change in log-odds for a one unit increase in the independent variables. Acute care appointments are chosen as the reference category and thereby set to 0 as our primary interest is to understand a customer's preventive health service utilization. The parameter vectors β are estimated by the maximum likelihood method. In addition to reporting the estimated multinomial logit coefficients, it is necessary to compute the magnitude of the effect of the independent variables (Petersen, 1985) and therefore the percent change in odds are also reported.

Analysis and results

The overwhelming majority of the population studied carry health care insurance (98 percent), and seek acute care appointments (91 percent). In terms of demographics, the population is heterogeneous across insurance groups and appointment types. Females and whites schedule more appointments than their counterparts. The average

patient is approximately 55 years old, however, there is variation in age, with a standard deviation of about 17 years.

To determine if multicollinearity is present, I examine the relationship between independent variables by analyzing multicollinearity diagnostic statistics. As depicted in Table I (Model 1a) and Table II (Model 1b), there is little evidence to suggest that the independent variables are correlated with preventive health service utilization since all of the correlations with this outcome are < 0.6 . Further, each condition index is < 30 , indicating multicollinearity is not creating problems in the estimates.

Tables III and IV present the results from the logistic regression analyses of preventive health service utilization. The findings demonstrate that the models fit the data, with a χ^2 statistic of 23,289.15 (nine) significant at 0.001 confidence level in Model 1a (Table III) and a χ^2 statistic of 233,345.66 (nine) significant at 0.001 confidence level in Model 1b (Table IV). The results from Model 1a will be discussed followed by a brief discussion on Model 1b. Further, as seen in Tables III and IV, both specifications of the model achieve a high degree of fit, as reflected by an R^2 of 0.347 in Model 1a (Table III) and an R^2 of 0.349 in Model 1b (Table IV).

As depicted in Models 1a and 1b (Tables III and IV) preventive health service utilization is influenced by need, enabling factors, and pre-disposing characteristics.

Model 1a (Table III)

As depicted in Table III, *H1* is supported. The main effect for need for service is in the expected direction. Health care customers who schedule primary care appointments are

	1	2	3	4	5	6	7
1 Preventive service utilization	1.000						
2 Primary care appointment	0.526***	1.000					
3 Insured	0.013***	0.012*	1.000				
4 Age at appointment	-0.174***	-0.168***	0.089***	1.000			
5 Gender (male)	-0.008**	-0.040***	-0.032***	0.054***	1.000		
6 Ethnicity (white)	-0.059***	-0.035***	0.074***	0.207***	0.010**	1.000	
7 Residency (in-state)	-0.005	0.013***	0.006	0.018***	-0.011***	0.031***	1.000

Notes: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table I.
Correlation matrix
(Model 1a)

	1	2	3	4	5	6	7
1 Preventive service utilization	1.000						
2 Primary care appointment	0.526***	1.000					
3 private insurance plan	0.120***	0.096***	1.000				
4 Age at appointment	-0.174***	-0.168***	-0.366***	1.000			
5 Gender (male)	-0.008**	-0.040***	-0.032***	0.054***	1.000		
6 Ethnicity (white)	-0.059***	-0.035***	0.055***	0.207***	0.010**	1.000	
7 Residency (in-state)	-0.005	0.013***	-0.044***	0.018***	-0.011***	0.031***	1.000

Notes: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table II.
Correlation matrix
(Model 1b)

Table III.
Model 1a logistic
regression results
for predicting
preventive service
utilization by need,
enabling factors
and pre-disposing
variables

Constructs	Independent variables	Base Model		Full Model	
		<i>b</i> (SE)	Percent change in odds	<i>b</i> (SE)	Percent change in odds
Need for service Enabling factors Pre-disposing variables	Appointment category (Primary care appointment)	3.365*** (0.027)	2,793.8	3.370*** (0.027)	2,808.10
	Insurance (Insured)	0.474*** (0.098)	60.6	−0.446 (0.348)	−36.0
	Age at appointment	−0.019*** (0.001)	−1.9	−0.042*** (0.007)	−4.2
	Gender (male)	0.165*** (0.026)	17.9	0.681*** (0.198)	97.5
	Ethnicity (white)	−0.232*** (0.026)	−20.7	−0.713*** (0.222)	−51.0
	Interaction variables	Insurance × Age		0.023** (0.007)	2.3
		Insurance × Gender		−0.525** (0.199)	−40.9
		Insurance × Ethnicity		0.487* (0.223)	62.8
	Control	Residency (in-state)		−0.325*** (0.078)	−27.80
		Constant		−1.847	
Model fit	Log-likelihood	−22,388.882		−22,377.033	
	Likelihood ratio statistic (df)	23,265.45 (6)		23,289.15 (9)	
	Pseudo <i>R</i> ²	0.342		0.342	
	AIC	44,791.76		44,774.07	
	BIC	44,859.19		44,870.39	
	<i>n</i>	112,672		112,672	

Notes: Entries are unstandardized (*b*) with SEs in parentheses. **p* ≤ 0.05; ***p* ≤ 0.01; ****p* ≤ 0.001

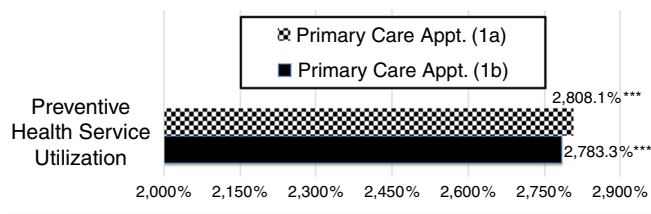
2,808 percent more likely to schedule preventive care appointments than acute care appointments (*b* = 3.370, *p* ≤ 0.001, Figure 3). The size of this effect is most likely due to the nature of a primary care appointment. Although primary care appointments treat a broad array of disorders, a key goal for providers is to teach healthy lifestyle choices and engage their health care customers in preventive care.

As anticipated, I find a positive effect for insurance serving as an enabler for preventive health service utilization in the base model (*b* = 0.474, *p* ≤ 0.001). However, when I account for the heterogeneity across different groups (Full Model), I find the main effect of having insurance is no longer significant on preventive service access (*b* = −0.446 *p* > 0.05; Figure 4). Thus, *H2a* is not supported.

As seen in the full model, the main effects for age, gender, and ethnicity are significant (*p* ≤ 0.001). In support of *H3a*, age at appointment is found to be associated with less preventive service appointments (*b* = −0.042, *p* ≤ 0.001, Figure 5). For each additional year in age, the likelihood of a health care customer scheduling a preventive service appointment decreases by 4.2 percent. This finding supports previous research that older individuals may face additional barriers to access in terms of decreased motivation and awareness (Schutzer and Graves, 2004). In addition, perhaps younger

		Base Model		Full Model		The impact of insurance coverage
Constructs	Independent variables	<i>b</i> (SE)	Percent change in odds	<i>b</i> (SE)	Percent change in odds	
Need for service	Appointment category (Primary care appointment)	3.363*** (0.027)	2,787.2	3.361*** (0.027)	2,783.30	287
Enabling factors	Insurance type (private insurance)	0.489*** (0.026)	63.0	0.944*** (0.084)	157.2	
Pre-disposing variables	Age at appointment	-0.015*** (0.001)	-1.5	-0.013*** (0.001)	-1.3	
	Gender (male)	0.157*** (0.026)	17.0	0.200*** (0.037)	22.2	
	Ethnicity (white)	-0.276*** (0.026)	-24.1	-0.271*** (0.038)	-23.7	
Interaction variables	Insurance Type × Age			-0.008*** (0.002)	-0.8	
	Insurance Type × Gender			-0.086 (0.052)	-8.3	
	Insurance Type × Ethnicity			-0.028 (0.052)	-2.8	
Control	Residency (in-state)	-0.292*** (0.080)	-25.3	-0.279** (0.081)	-24.30	
Model fit	Constant	-2.724		-2.891		
	Log-likelihood	-21,811.054		-21,794.302		Table IV. Model 1b logistic regression results for predicting preventive service utilization by need, enabling factors and pre-disposing variables
	Likelihood ratio statistic (df)	23,312.15 (6)		23,345.66 (9)		
	Pseudo <i>R</i> ²	0.348		0.349		
	AIC	43,636.11		43,608.6		
	BIC	43,703.39		43,704.72		
	<i>n</i>	110,399		110,399		

Notes: Entries are unstandardized (*b*) with SEs in parentheses. * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$



Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Model 1a: Insurance, Model 1b: Insurance type

Figure 3.
Logit results for predicting preventive health service usage by need

patients are better motivated to engage in preventive services due to their tendency to have a greater aptitude for technology. Technological advancements in e-health care have made connecting with physicians and managing one's health easier. However, research has found that a technological divide could create greater access disparities for some populations (Fortney *et al.*, 2011).

Figure 4.
Logit results for
predicting preventive
health service usage
by insurance
coverage and
insurance type

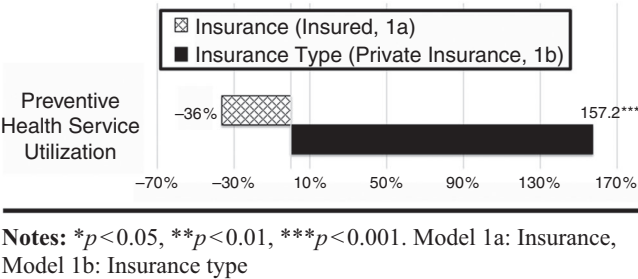


Figure 5.
Logit results for
predicting preventive
health service
usage by age

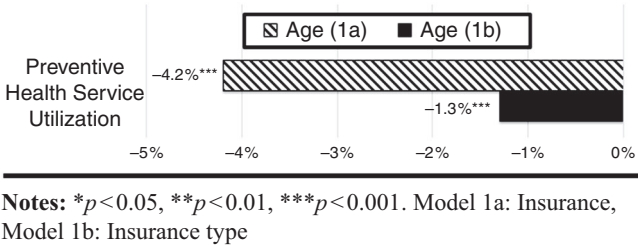
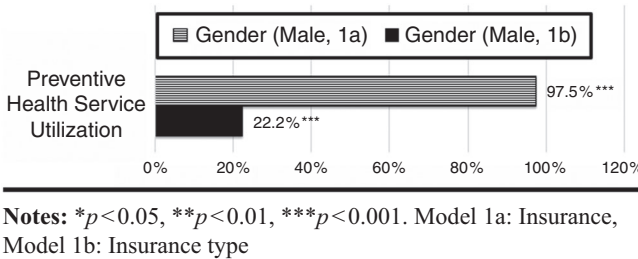


Figure 6.
Logit results for
predicting preventive
health service
usage by age



Interestingly, in contrast to prior research, males are found to be more 97.5 percent more likely to schedule preventive health service appointments than females ($b = 0.681$, $p \leq 0.001$, Figure 6). Thus, $H3b$ is not supported. This finding may be due to the discrepancy between males and females overall level of health. Research has found that females' health is more robust at every age (Austad, 2006) and they face less severe chronic conditions (Case and Paxson, 2005) than males. Our findings suggest that males may use more preventive services because the need for preventive services is greater as their health conditions warrant frequent monitoring (i.e. glucose checks, EKG's, smoking cessation programs, etc.).

As discussed, research has found that minorities face many challenges in terms of access to care. However, I did not find support for $H3c$. Interestingly, I find that whites are 51 percent less likely to schedule preventive service appointments compared to nonwhites ($b = -0.713$, $p \leq 0.001$, Figure 7). This unexpected finding warrants further research as the majority of literature finds that nonwhites are less likely to use health care services due to various financial and nonfinancial barriers (Ashton *et al.*, 2003).

In support of *H4a*, is the finding that the age effect, gender effect, and ethnicity effect on the probability of using preventive health services depends on the customer's insurance coverage status. I find the effect of ethnicity on preventive health service utilization varies by the customer's insurance coverage status ($b = 0.487$, $p \leq 0.05$). The moderating effect of insurance on ethnicity is larger for nonwhites than whites. Regarding white patients, it appears that insurance coverage is inconsequential regarding preventive health service use.

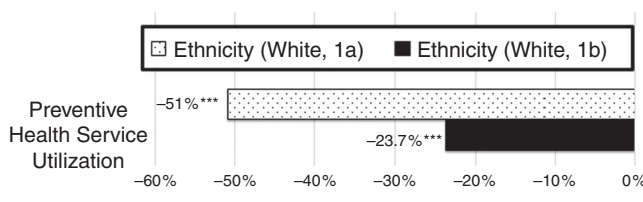
I find the effect of age on preventive health service usage varies by insurance coverage status ($b = 0.023$, $p \leq 0.01$). The predicted probability of scheduling a preventive health service is higher for uninsured customers than insured customers regardless of age. However, due to the age effect, the disparity between uninsured customers and insured customer on service usage diminishes as patients get older. Thus, I find that health care customers exhibit similar usage behaviors as they get older regardless of insurance coverage status.

When considering the gender effect, I find that insurance coverage plays an important role. The moderating effect of insurance is much larger for males than it is for females ($b = -0.525$, $p \leq 0.01$). This finding is consistent with previous research on service utilization among males and females. Traditionally, females have been found to utilize more services yet are less likely to be covered by insurance than males. Therefore, insurance coverage status for females does not appear to play as large a role in the decision-making process as it does for males.

Interestingly, I find that when insurance is controlled for (Base Model, Model 1a) the main effect for preventive health service utilization is positive as hypothesized. When I account for the heterogeneity in the model (Full Model, Model 1a) I find that having insurance is no longer significant. Therefore, I may conclude that the interactions in the model are quite significant.

Model 1b (Table IV)

As depicted in Table IV (Model 1b), I expected to find differences in service usage among the two insurance groups due to a patients' different financial responsibilities regarding payment of care and differences regarding their eligibility for care. When considering the varying effects of insurance types, I find that patients covered by a private insurance program are more likely to schedule preventive care services than patients covered by a government sponsored plan. Thus, *H2b* is supported. Specifically, health care customers covered by HMOs, PPOs and POS plans are 157.2 percent ($p \leq 0.001$, Figure 4) more likely to schedule preventive care appointments than patients covered by Medicare, Medicaid and other federal programs. This finding is



Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Model 1a: Insurance, Model 1b: Insurance type

Figure 7.
Logit results for
predicting preventive
health service usage
by ethnicity

consistent with the expectation that private plans appear considerably less restrictive than government plans. Further research exploring the difference of the effect of private and government insurance on access to care is necessary.

Based on my results, *H4b* is partially supported. Due to the age effect, service usage varies by type of insurance plan ($b = -0.008, p \leq 0.001$). As depicted in Figure 8, it is evident that the likelihood of using preventive care, when considering type of health insurance coverage, is varied among different age groups. Younger patients who have a private insurance plan are more likely to use preventive services than older patients who are privately insured. Based on my findings (Models 1a and 1b) it is interesting to note that the size of the effect of age on preventive service usage depends on insurance coverage status and type. Specifically, the age effect will be greater earlier in life than later in life when considering insurance coverage and insurance type. This result may be influenced by the customer's eligibility of attaining government insurance when they reach the minimum age requirement.

Interestingly, the interactions between private insurance and ethnicity and private insurance and gender are not found to be significant. This finding is surprising as the interaction effect between insurance coverage and gender and insurance coverage and ethnicity is found to be significant in Model 1a. Thus, I find that different demographic groups are more responsive to the presence of insurance coverage rather than the type of coverage. Further research regarding these findings are necessary.

Wald test

To allow for a better assessment of the statistical significance of the individual coefficients I conducted Wald Tests. Specifically, my goal is to determine if the effect of each of the independent variable on future preventive service utilization is different between variables. As depicted in Tables V and VI, I find that there is a statistically significant difference in outcome between each of the independent variables on future preventive service utilization except for: age and insurance status and ethnicity and insurance status. Based on these findings, it is evident that need for service has the largest effect on preventive health service utilization (Models 1a and 1b). The second largest effect was found for insurance type (Model 1b). Both of these findings are consistent with previous research.

Interestingly, the difference in effects of: age and insurance and ethnicity and insurance on preventive health service utilization was not found to be statistically significant. This finding is most likely due to different insurance companies' policies

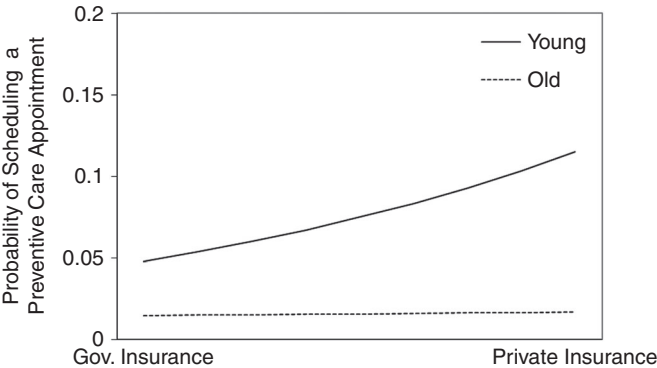


Figure 8.
Predicted probability
of scheduling a
preventive care
appointment across
ages between
privately insured
and government
insured patients

and the barriers related to service access. First, nearly all customers are eligible to attain government insurance when they reach the minimum age requirement. Second, as discussed earlier, insurance coverage has historically posed as a barrier to access for certain ethnic groups.

Robustness check

To test for model robustness, and assess the potential for left censoring bias, a sensitivity analysis was conducted on the model where the last three months of data (January 1, 2011-March 31, 2011) were removed from the original estimation (January 4, 2010-March 31, 2011), while the full data set were retained to compute the independent variables. The results from this analysis are identical in terms of the valence and significance of the estimates, indicating that there is no significant left censoring bias in the data.

To further test for model robustness, a cross-tab analysis of observed and predicted outcomes was conducted to determine the percentage of cases that are correctly predicted, where a positive relationship is present if the probability is 0.5 or more and a negative outcome otherwise. In this application, I predict 91.55 percent of the cases in Model 1a and 91.89 percent of the cases in Model 1b.

		χ^2				
		Appointment category (primary care appointment)	Insurance (insured)	Age at appointment	Gender (male)	Ethnicity (white)
Independent	Appointment category (primary care appointment)	—				
Variables	Insurance (insured)	119.22***	—			
	Age at appointment	14,902.91***	1.40	—		
	Gender (male)	184.75***	10.97***	13.42***	—	
	Ethnicity (white)	332.76***	0.50	9.13**	23.39***	—
Notes: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$						

Table V.
Wald test results of
whether the effect of
an independent on
preventive health
service utilization is
different from the
effect of another
independent
variables (Model 1a)

		χ^2				
		Appointment category (primary care appointment)	Type of insurance (private)	Age at appointment	Gender (male)	Ethnicity (white)
Independent	Appointment Category (primary care appointment)	—				
Variables	Type of insurance (private)					
	Age at appointment	767.00***	—			
	Gender (male)	15,726.12***	135.91***	—		
	Ethnicity (white)	5,214.2***	72.86***	40.97***	—	
		5,912.07***	187.71***	49.68***	87.30***	—
Notes: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$						

Table VI.
Wald test results of
whether the effect of
an independent on
preventive health
service utilization is
different from the
effect of another
independent
variables (Model 1b)

Discussion

Engaging in sustainable preventive health care has long been found to enrich an individual's social well-being and decrease health care costs (Roth, 1994; Center of Disease Control, 2011). By applying the behavioral model of health services use I am able to identify the effect of need for care, enabling factors, and demographic covariates on preventive health service utilization. I find that primary care patients do have a greater need for preventive services than patients seeking specialty care. This finding is expected as most rational patients would typically engage in preventive health services in a primary care setting in attempt to ward off future diseases or ailments that could require them to seek specialty care. Future research should consider how health care customer's need for preventive services varies among different provider specialties.

Interestingly, before I account for the heterogeneity across the different groups I find that having insurance is an enabler to care (Table III, Model 1a, Base Model) yet the effect becomes insignificant when I account for the heterogeneity among groups (Model 1a, Full Model). However, when I consider the interaction effects between insurance and pre-disposing characteristics, I recognize that service usage does depend on insurance coverage between different demographic groups. In addition, I find that the type of health plan a patient carries plays an important role in preventive service utilization when considering a customer's age. Based on the results, it is clear that insurance can serve as an enabler to service, but the degree to which care is sought is affected by the type of insurance plan held and the customer's pre-disposing characteristics.

Managerial implications

The primary goal of this research is to help improve preventive service utilization by identifying variables that affect customer access to services. Based on previous research (Andersen, 1968, 1995) and the results in this study, need for service, enabling factors and pre-disposing characteristics have a significant effect on preventive service utilization. Interestingly, I found evidence to support that certain groups are more likely to use preventive services based on their existing characteristics (e.g. younger patients, males, nonwhites). In addition, I find that within certain groups, having insurance will affect the likelihood of using preventive services. For example, due to the gender effect on preventive service utilization, the effect of insurance coverage status is larger for males than it is for females.

Understanding health care access is a fundamental concern for policymakers and management. Identifying the presence and relative impact of each appointment category, insurance coverage status, insurance type, age, gender, and ethnicity on preventive service usage affords managers and marketers alike the ability to reduce barriers to access. Specifically, this framework affords management the ability to improve a customers' access to services by identifying specific segments that face barriers to services.

By identifying segments of the population that are more prone to schedule preventive service appointments, management can employ targeting mechanisms to appropriately meet the needs of the desired population. In addition, by exploring how preventive service appointments scheduled vary by need for service, insurance coverage and type, as well as by pre-disposing demographic characteristics, offers deeper insight into the possible underlying mechanisms driving preventive service utilization. A key takeaway for management is the ability to target programs more effectively by understanding the profiles of health care customers who schedule appointments and the possible interaction between variables on access to services.

Through this research, I offer a framework to enhance theoretical and practical understandings of service usage in most service industries. Albeit this research is limited to the health care setting, the framework and model are likely to be generalizable and applicable to most service organizations. For example, most service industries can benefit from a deeper understanding into how customer's need, enabling factors and pre-disposing characteristics influence service usage. Identifying drivers of access affords management the opportunity to develop and target programs more effectively (Zuvekas and Taliaferro, 2003). It is my intent that this research sheds light on the underlying factors associated with access to services in order to drive change and improve access to services. Through this framework, management will have the requisite knowledge to target segmented populations based on need, insurance, and pre-disposing variables which will help improve access to services and ultimately, in this context, health care customers' outcomes.

Caveats and future research

This paper is limited to secondary data from one organization that captures customer appointments for one year. First, I recognize that service usage is influenced by both the behavior and attitude of the customer. Specifically, customer satisfaction in any service industry is a key focus of research practitioners (Robson and Sekhon, 2011). Future work will incorporate both attitudinal and behavioral measures to obtain a more comprehensive evaluation of service access. Second, to add to the robustness of the analyses, future work will include other hospital organizations and longer time periods.

The framework and conclusions found in these analyses can be applied to a broad range of other service sectors, such as travel, financial services, etc.; all of which are service areas that are driven by need, enabling factors and pre-disposing characteristics. For example, this framework could be applied to determine which customers are most likely to attain and subsequently use travel insurance. In this scenario, a customer's need could be conceptualized as their ability to maintain travel reservations based on their previous service history. Enabling factors are the customer's necessary capital (i.e. income) required to attain the service, and pre-disposing characteristics are the customer's socio-demographic variables. Similarly, this framework could be applied to investigate a customer's procurement of a life insurance policy. It would be interesting to investigate how a customer's need for a life insurance policy (based on their health status), enabling factors (i.e. capital to acquire and maintain the policy) as well as pre-disposing characteristics (i.e. age, gender, and ethnicity) affect the customer's ability to attain a life insurance policy.

In general, customers' understanding of health insurance coverage is extremely limited and often inaccurate (Loewenstein *et al.*, 2013). Health care customers are inundated with information regarding different insurance plans available, yet still struggle to make decisions regarding which insurance plan best meet their needs. The customer's decision to procure insurance is also affected by their awareness of risk. The marketing literature has shown that a customer's perceived level of risk is an important determinant in their purchasing behavior (Conchar *et al.*, 2004). Estelami (2009) found that individual's acquisition of insurance products varies by their perceived awareness of risk and often results in excessive or insufficient insurance coverage. It would be interesting to study how the customer's perceived awareness of risk influences their choice of medical care coverage. For example, future research should consider how a customer's perceived level of risk influences their choice of insurance policy (i.e. HMO vs PPO, etc.) and in turn how their decision influences service usage.

According to the Massachusetts health care reform law, known as Chapter 58, the state of Massachusetts has required nearly all of their residents to have insurance since 2006. In their study to examine the impact of this legislation on insurance coverage, utilization patterns, and patient outcomes in Massachusetts, Kolstad and Kowalski (2012) found that insurance coverage, as a means to decrease cost of care, facilitates increased preventive care. Similarly, increased preventive service utilization across the USA can be expected due to the Affordable Care Act. However, I would like to highlight the fact that although the number of uninsured individuals will continue to dwindle due to the Affordable Care Act (DeParle, 2010) it is important to recognize that increased eligibility for insurance does not necessarily increase the efficiency with which care is delivered (Currie and Gruber, 1996). Future research should therefore consider the impact of preventive health utilization on patient's overall health outcomes and delve deeper into the varying types of insurance coverage as it relates to service access.

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About the author

Dr Genevieve Elizabeth O'Connor is an Assistant Professor at the Fordham University. Dr Genevieve Elizabeth O'Connor can be contacted at: geoconnor@fordham.edu

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