

## Health Insurance Participation: The Role of Cognitive Ability and Risk Aversion

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**Abstract.** *The decision to enroll in employer-offered health insurance or purchase insurance in the individual market requires consumers to consider numerous possibilities, most in an environment characterized by imperfect information. This paper introduces an adapted behavioral framework to predict health insurance coverage among employed workers. Results indicate that consumers in the higher quartiles of intelligence are increasingly more likely to have enrolled in an employer's health insurance policy or purchased insurance in the individual market. Also, respondents with a higher tolerance for risk are less likely to be insured than those less tolerant of risk.*

**Keywords:** consumer behavior; health insurance; intelligence; risk tolerance; uninsured.

**JEL Codes:** D12, D14, J24.

**REL Code:** 7A.

## Introduction

Health insurance is a financial product that simultaneously reduces one's exposure to dramatic financial loss (Ehrlich, Becker, 1972) and helps assure access to acute and preventive medical care that is associated with improved health status (Ross, Mirowsky, 2000). Like most financial decisions, the decision to enroll in employer-offered health insurance or purchase insurance in the individual market requires consumers to consider numerous possibilities. For example, a consumer must take into account whether medical care will be necessary, how much the medical care will cost if needed, the level of resources available to meet both certain and uncertain future medical care needs, and the opportunity cost of using resources for insurance (Nielsen, Garasky, 2008). To complicate matters further, health insurance purchasing decisions are made in a context of an individual's unique aversion to risk. Consumers, then, must assess the uncertain costs of purchasing insurance (in the form of premiums, deductibles, co-payments, opportunity costs) while assessing their willingness to bear physical and financial risk.

To provide some insight into the role that cognitive ability and risk tolerance play in consumers' decisions to enroll in employer-provided health insurance or purchase insurance in the individual market, this paper introduces an adapted behavioral framework that models the probability that employed workers have health insurance.

### 1. Empirical framework

The empirical framework for this research draws from Andersen's behavioral model of health services utilization (Andersen, 1995). The original behavioral model, and the research communities' incremental adaptations (Aday, Awe, 1997, Aday, Fleming, Andersen, 1984, Andersen, 1995, Andersen, Rice, Kominski, 2001), predicts that an individual's use of medical services is a function of several characteristics that Andersen labeled as predisposing characteristics, enabling characteristics, and need based factors. *Predisposing characteristics* that influence one's interactions with medical services include family composition, social and demographic characteristics, and health beliefs (e.g., the attitudes, beliefs, and knowledge), and other factors – including genetic and psychological characteristics – that influence one's probability of seeking care. *Enabling characteristics* are family – and community – specific resources related to medical service access, including income, financial resources, health insurance, and one's attachment to a medical care provider. Community-specific enabling characteristics include the community's mix of physicians and hospitals,

population density, proximity to medical care providers, and the community's attitude about the use of medical services.

Variations of the behavioral model developed by Andersen are primarily used by economists, sociologists and health policy analysts who are interested in the dynamics of medical care access and utilization, particularly in the description and analysis of various populations' access to medical services (Aday et al., 1984, Aday, Awe, 1997, Andersen, 1995, Andersen et al., 2001). This original behavioral framework suggests that enabling resources are influenced by predisposing characteristics. For example, an individual's income (an enabling resource) is a function of education, occupation, and other enabling resources. Similarly, we estimate the unique contribution of one's psychological characteristics such as intelligence and risk tolerance on the enabling resource, health insurance.

## 2. Data and sample

To investigate the relationship between cognitive capacity and health insurance, this study uses the National Longitudinal Survey of Youth 1979 (NLSY79), a nationally representative panel of 12,686 respondents managed by the Center for Human Resource Research at The Ohio State University. The NLSY data contain detailed information on individual health insurance coverage as well as information on respondents' behavioral, socioeconomic and demographic characteristics. The 1979 wave is a national survey of individuals born between 1957 and 1964. The NLSY79 has interviewed the same individuals between 1979 and 2006 with 22 waves of this panel beginning in 1979 (Haurin, Gill, 1987). For this study, we use the health insurance related information from 2006 due to availability of detailed health insurance related data in this most recent NLSY survey. Because our research goal is to understand the characteristics of those who choose to participate in employer-sponsored or privately purchased health insurance plans, individuals who are unemployed and those who receive Medicaid are excluded from the study.

## 3. Variables

### *Dependent variable*

The dependent variable for this study is participation in employer-sponsored or privately-purchased health insurance plans. This is a binary variable coded "1" if the respondent has employer-sponsored or privately-purchased health insurance and as "0" otherwise.

*Independent variables*

The explanatory variables are comprised of the various predisposing characteristics and enabling resources drawn from the behavioral model of health service utilization (Aday, Awe, 1997, Andersen, 1995). Specifically, the primary predisposing characteristic of interest here is intelligence. Additional predisposing characteristics included as controls are demographics, social structure, health belief, genetic factors and individual risk tolerance.

The demographic and household components include family size, gender, marital status, age of the respondent and children. Age and family size are continuous variables; gender is binary coded as '1' for female and '0' if male; having children is also binary coded as '1' for having children and '0' if otherwise. For marital status, the married variable is included as reference and is compared against the single, divorced/separated and widowed variables, which are dummy coded and included in the model.

The social structure components comprise of educational attainment, work and race related information. Educational attainment of less than high school is used as the reference variable and compared against variables corresponding to completion of high school, some college, college degree and graduate studies. Occupation related controls include job tenure and hours worked per week (as a proxy to control for full time and part time employment); and binary coded variables for white collar job and union membership. In the case of race, White variable is used as the reference and is compared against Black, Hispanic and other races. The health beliefs and practices components include binary coded variables for smoking, reading nutrition labels before grocery purchase and exercising regularly.

The binary variables for mother and father living are coded as '1' if alive and '0' if not. These variables are used as proxies for unmeasured genetic characteristics that may be associated with respondents' life expectancy. Psychological characteristics included in the model are risk tolerance and IQ. The risk tolerance variable is continuous whereas the IQ variable is split into quartiles. Quartile 1 is used as reference and is compared against the quartiles 2, 3 and 4 of intelligence. Enabling resources that we model as correlates (controls) of health insurance status include family income, homeownership, and region of residence in the United States. Income is included as a continuous natural log. With respect to region, living in the West is included as reference, whereas living in the Northeastern, Northcentral and Southern United States are included as binary variables. Homeownership is coded as '1' if the respondent owns home and as '0' if the respondent is a renter.

*Measurement of risk tolerance*

Following Amuedo-Dorantes and Pozo (2002) study using the NLSY79, we created an indicator of respondents' risk tolerance using responses to questions from the 2006 wave that addressed respondents' attitudes towards risk. The NLSY risk variable is included as a predisposing characteristic and coincides with those created by Lusardi (1998) from the HRS dataset.

*Measurement of intelligence*

NLSY participants completed the Armed Services Vocational Aptitude Battery in 1980, which is transformed into an intelligence percentile using the Armed Forces Qualifying Test. The test is demonstrably equivalent to an IQ test, and correlates strongly with other tests of cognitive ability (Glaeser, Mare, 2001). Intelligence is coded into quartiles.

#### 4. Analysis

*Descriptive statistics*

A descriptive statistical analysis is initially performed to examine the demographic composition, social structure, health beliefs, genetic as well as psychological factors and enabling characteristics for both insured and uninsured. Means tests are also performed to determine whether there exist significant behavioral, socioeconomic and demographic differences between the insured and uninsured groups of respondents.

*Health insurance status*

This study examines the determinants of having health insurance after controlling for the predisposing and enabling characteristics based on Andersen's behavioral model. The dependent variable is binary; hence a logistic estimation technique is used to calculate the coefficients of the hypothesized variables (Wooldridge, 2006). We estimate the following model for this analysis:

*Health insurance status = f(demographic composition, social structure, health beliefs, genetic factors, psychological factors, income, homeownership, region)*

#### 5. Empirical results

*Descriptive statistics*

Table 1 shows the demographic characteristics, social structure, health beliefs, genetic and psychological factors, and enabling characteristics of the sample. The demographic characteristics show that a higher percentage of

insured are women (52.3%) and married (65.8%). The descriptive statistics also show that a higher percentage of uninsured have not attended college (65.3%). Furthermore, a significantly higher percentage of the insured hold white collared jobs (40.8%) or belong to a union (21.0%); and work for 40 hours or more (41.1%) in a week. Besides, while 69.5% of uninsured are smokers; a significantly higher percentage of the insured read nutrition labels (47.3%) and exercise regularly (51.0%). Also the parents of a greater percentage of the insured are still living. A significantly higher percentage of the insured are in the third and fourth quartiles of intelligence; whereas a higher percentage of the uninsured are in the first and second quartiles of intelligence. The descriptive composition of enabling resources reveals that the insured have higher average family income (\$80,877) when compared with the uninsured (\$30,992). Higher percentages of the insured are homeowners and live in the Northeastern or Northcentral United States.

*Predictors of health insurance participation and discussion*

Table 2 shows the logistic regression estimates of participation in health insurance plans. The results show that several enabling resources described in Andersen's behavioral model are positively associated with being insured, including income, homeownership and residence (Northeast). Compared to the married respondents, the single, divorced or separated and widowed respondents are less likely to have health insurance. Also, compared to individuals who have not completed high school, educational attainment of high school or higher increases the likelihood of being insured. Among occupational characteristics, longer job tenure is a positive predictor of having health insurance. Individuals who are more conscientious about taking care of their health, as proxied by reading nutrition labels before purchasing groceries, are more likely to be insured; conversely, individuals who are smokers are less likely to be insured.

With respect to the characteristics of interest to us, the predisposing characteristics intelligence and risk tolerance are significantly associated with being insured after controlling for all other characteristics identified in our modified behavioral model and available in the NLSY data. Notably, consumers in the higher quartiles of intelligence are increasingly more likely to have health enrolled in an employer's health insurance policy or purchased insurance in the individual market. Also, respondents with a higher tolerance for risk are less likely to be insured than those less tolerant of risk.

## 6. Conclusion

This paper uses data from NLSY79 to investigate whether intelligence and risk tolerance play a role in an individual's decision to purchase health insurance. Importantly, the respondents in this data set are between the ages of 37 and 49, thus comprising of young baby-boomers in the wealth formation phase of their life cycle. As a product that reduces both the probability of an income shock by improving access to preventive and acute medical care, and as a product that reduces the magnitude of any financial shock that may arise through an unexpected health event, health insurance needs to play a role in the financial strategies for this cohort. Prior research has demonstrated the household-level effects of individual-level insurance status (Nielsen, Garasky, 2008). In this context, health economists and policy makers must continue to exploit data that offer insights into how the life course differs by various behavioral and risk related characteristics and the role that health insurance plays in protecting the physical and economic well-being of individuals. As the debate on health care and health insurance coverage continue across the nation, the lower participation rates among individuals with lower intelligence and higher risk tolerance combined with the negative association between lower levels of education and health insurance coverage pose a serious challenge for policy makers and health economists who are trying to develop ways to increase health insurance coverage in the population. The results of this study are interesting in that consumers with lower cognitive capacity and higher risk tolerance are making decisions about health insurance that are different than their higher-capacity and lower risk tolerant peers. Economists, policy makers and scholars of health insurance and health care utilization need to further investigate these relationships in the future.

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Table 1

## Descriptive statistics and T tests

Variables		All	Insured	Uninsured	T test	Sig
Overall		100.00%	81.70%	18.30%		
<b>Predisposing characteristics</b>						
<i>Demographic</i>						
Age	Continuous	44.66	44.69	44.53	2.01	**
Female	Equal to 1 if yes; 0 otherwise	51.08%	52.34%	45.30%	4.18	***
Married	Equal to 1 if yes; 0 otherwise	59.84%	65.80%	33.23%	19.56	***
Family size	Continuous	3.02	3.11	2.59	8.34	***
Have children	Equal to 1 if yes; 0 otherwise	81.67%	81.78%	81.13%	0.49	
<i>Social structure</i>						
Education						
< 12 years	Equal to 1 if yes; 0 otherwise	9.75%	7.21%	21.10%	-14.42	***
12 years	Equal to 1 if yes; 0 otherwise	43.20%	40.74%	54.18%	-8.09	***
13-15 years	Equal to 1 if yes; 0 otherwise	24.92%	26.30%	18.77%	5.05	***
16 years	Equal to 1 if yes; 0 otherwise	12.12%	14.08%	3.35%	9.81	***
>16 years	Equal to 1 if yes; 0 otherwise	10.01%	11.67%	2.60%	7.89	***
Race						
White	Equal to 1 if yes; 0 otherwise	44.26%	47.09%	31.69%	9.25	***
Black	Equal to 1 if yes; 0 otherwise	29.05%	26.85%	38.85%	-7.81	***
Hispanic	Equal to 1 if yes; 0 otherwise	12.75%	12.25%	14.97%	-2.52	**
Others	Equal to 1 if yes; 0 otherwise	13.94%	13.81%	14.49%	-1.53	*
Occupation						



White collar job	Equal to 1 if yes; 0 otherwise	38.00%	40.83%	25.33%	8.53	***
Union membership	Equal to 1 if yes; 0 otherwise	18.26%	21.03%	5.88%	11.11	***
Hours worked/ week	Continuous	40.36	41.13	36.86	10.98	***
Job tenure	Continuous	12.61	12.63	12.51	0.19	
<b>Health beliefs</b>						
Smoker	Equal to 1 if yes; 0 otherwise	56.89%	54.06%	69.52%	-9.32	***
Read nutrition labels	Equal to 1 if yes; 0 otherwise	43.80%	47.34%	28.07%	11.65	***
Exercise regularly	Equal to 1 if yes; 0 otherwise	49.89%	50.96%	45.26%	3.38	***
<b>Genetic factors</b>						
Father living	Equal to 1 if yes; 0 otherwise	60.43%	61.98%	53.38%	5.13	***
Mother living	Equal to 1 if yes; 0 otherwise	79.73%	81.05%	73.80%	5.33	***
<b>Psychological factors</b>						
IQ quartile 1	Equal to 1 if yes; 0 otherwise	25.53%	21.36%	40.94%	-15.69	***
IQ quartile 2	Equal to 1 if yes; 0 otherwise	24.78%	24.13%	27.88%	-2.58	**
IQ Quartile 3	Equal to 1 if yes; 0 otherwise	24.47%	26.51%	22.62%	3.88	***
IQ Quartile 4	Equal to 1 if yes; 0 otherwise	25.22%	28.00%	8.56%	14.01	***
Risk tolerance	Continuous	1.94	1.88	2.20	-7.96	***
<b>Enabling resources</b>						
Family income	Continuous	\$71,747	\$80,877	\$30,992	19.58	***
Own home	Equal to 1 if yes; 0 otherwise	67.72%	72.36%	43.64%	17.06	***
<b>Region</b>						
West	Equal to 1 if yes; 0 otherwise	19.81%	19.79%	19.96%	-0.49	
Northeast	Equal to 1 if yes; 0 otherwise	14.93%	16.03%	9.79%	5.28	***
Northcentral	Equal to 1 if yes; 0 otherwise	24.06%	25.15%	19.11%	4.17	***
South	Equal to 1 if yes; 0 otherwise	41.20%	39.03%	51.14%	-7.28	***

\*p<.1, \*\* p<.05, \*\*\* p<.01

Table 2

#### Likelihood of health insurance coverage

Variables (N=2601)	Coef	MFx	Odds	St.Error	Sig.
<b>Enabling resources</b>					
Log Income	0.095	0.012	1.173	0.028	***
Homeowner	0.409	0.046	1.328	0.140	***
<b>Region(Ref: West)</b>					
Northeast	0.411	0.049	1.544	0.226	*
Northcentral	0.295	0.028	1.478	0.191	
South	-0.228	-0.024	0.927	0.164	
<b>Predisposing characteristics</b>					
<b>Demographic</b>					
Age	0.037	0.006	1.017	0.027	
Female	0.171	0.025	1.309	0.125	
<b>Marital status (Ref: Married)</b>					

Single	-0.622	-0.116	0.508	0.197	***
Divorced/Separated	-0.569	-0.096	0.540	0.173	***
Widowed	-0.630	-0.067	0.542	0.439	
Family size	0.075	0.012	1.073	0.050	
Children	-0.309	-0.033	0.722	0.281	
<i>Social structure</i>					
Education (Ref: <High School)					
High School	0.496	0.053	1.869	0.182	***
Some College	0.851	0.080	2.802	0.220	***
College	1.354	0.108	5.177	0.386	***
Graduate	1.518	0.115	6.462	0.330	***
Occupation					
White Collar job	0.169	0.015	1.091	0.123	
Union membership	0.002	0.002	1.029	0.157	
Hours Worked per week	0.005	0.001	1.005	0.006	
Job Tenure	0.001	0.000	1.001	0.000	***
Race (Ref: White)					
Black	0.182	0.015	1.283	0.164	
Hispanic	-0.116	-0.022	0.904	0.186	
Others	0.049	0.017	1.169	0.819	
<i>Health beliefs and practices</i>					
Smoker	-0.218	-0.029	0.906	0.130	*
Read Nutrition Labels	0.486	0.050	1.713	0.129	***
Exercise Frequently	0.083	0.008	1.029	0.122	
<i>Genetic factors</i>					
Father living	0.015	0.001	1.030	0.124	
Mother living	0.017	0.004	1.064	0.144	
<i>Psychological characteristics</i>					
IQ (Ref: Quartile 1)					
IQ quartile 2	0.1320	0.0252	1.1407	0.1752	
IQ Quartile 3	0.3027	0.0327	1.2617	0.0159	**
IQ Quartile 4	0.6659	0.0685	1.7059	0.0213	***
Risk Tolerance	-0.0979	-0.0103	0.9308	0.0508	*
Intercept	-3.0356			1.2664	***
Pseudo R-square	0.1867				

\*p<.1, \*\* p<.05, \*\*\* p<.01