

Private Supplemental Insurance and Mental
Health Care Utilization in Canada - An
Investigation Using Nonparametric Estimation
Methods

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Purpose

The purpose of this paper is to estimate the impact of private supplemental insurance on the use of mental health care goods and services.

Motivation

- ▶ A person's ability to study, work, and make daily decisions depends on his or her mental health.
- ▶ Close to one-third of long-term disability claims are for mental health reasons (MHCC 2012).
- ▶ Every year depression and anxiety account for approximately \$50 billion in lost GDP (Conference Board of Canada, 2016)
- ▶ People living with a mental illness utilized more physician visits, specialist visits, and hospital days, on average, compared to those without a mental illness (Prina et al. 2013, Lim et al. 2008).

Motivation

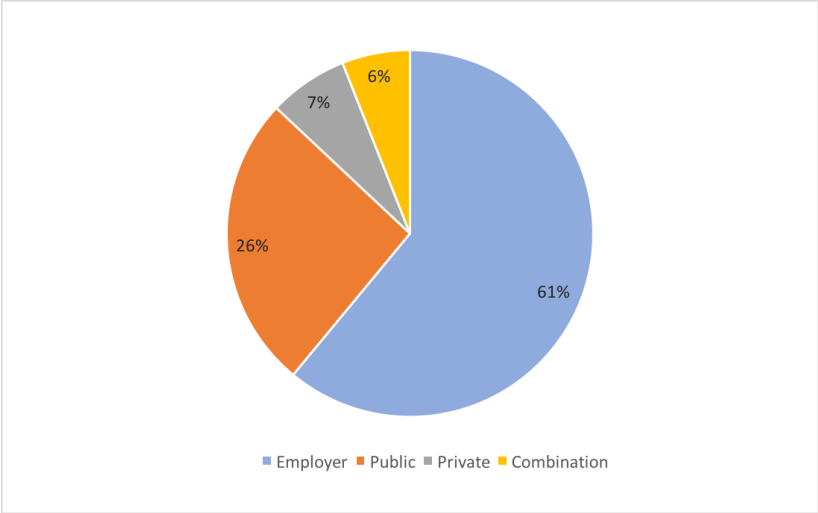
- ▶ Experiences with mental illness are not the same for everyone.
 - ▶ Type of illness or illnesses
 - ▶ Severity
- ▶ Heterogeneous nature of mental illness leads to specialized treatment plans for those who suffer from the disease.
 - ▶ Medication
 - ▶ Therapy/counselling
 - ▶ Diet/exercise

Motivation

- ▶ Public health care system covers medically necessary physician and in-patient hospital services.
- ▶ Public coverage for non-physician services and prescription drugs
 - ▶ Cost-sharing
 - ▶ Patient Characteristics (Seniors or those on income assistance)
- ▶ Non-physician services and prescription drugs can be expensive.
 - ▶ E.g. Psychologist services in Ontario cost \$225/hr
 - ▶ Antidepressants: \$35-\$280 for 90 day prescription
 - ▶ Antipsychotics: \$25-\$165 for 90 day prescription
 - ▶ Benzodiazepines: \$15-\$25 for 90 tablets (Alberta College of Physicians, 2016)

Motivation

Pie Chart of Supplementary Insurance Holders (Source: Statistics Canada, 2014)



Research Questions

- ▶ My research is guided by the following questions:
 1. How does supplemental insurance affect the use of mental health pharmaceuticals?
 2. How does supplemental insurance affect the use of health care professionals for mental health issues?

Previous Works

- ▶ Mulvale and Hurley (2009):
 - ▶ 2002 Canadian Community Health Survey
 - ▶ Medication usage measured as binary use/no use.
 - ▶ Logit specification.
 - ▶ Insurance positively affects the use of anti-depressants and anti-psychotics.
 - ▶ Income is insignificantly related to mental health pharmaceutical utilization.

- ▶ Devlin, Sarma, and Zhang (2011):
 - ▶ Used supplementary insurance for prescription drugs as proxy for other services.
 - ▶ Physician health care services respond to the presence of insurance.
 - ▶ Reduces hospital admissions for ambulatory care sensitive conditions.

Current Paper

- ▶ 2012 Canadian Community Health Survey - Mental Health Component
- ▶ Medication use measured as use/no use and as number of medications taken.
- ▶ Nonparametric estimation methods.
- ▶ Use of mental health care professionals measure in number of hours.
- ▶ Individuals with lower family-adjusted income have a higher probability of taking more medications for mental illness.

Data

- ▶ 2012 Canadian Community Health Survey - Mental Health Component (CCHS-MH)
 - ▶ Canadians aged 15 years or older
 - ▶ Excludes individuals in the military, living on native reserves, and individuals in institutions.
 - ▶ Total of 25,113 observations.
- ▶ Purpose: Study a myriad of issues related to the mental health of Canadians.
 - ▶ Assess mental health
 - ▶ Access to health care services
 - ▶ Assess the effect of mental health on individuals' lives

Data

1. Did you take a [drug type] for mental illness in past two days?
2. How many [drug type] did you take in the past two days?
3. Did you visit a [health care provider] for a mental illness in the past 12 months?
4. How many hours did you spend with the [health care provider] dealing with your mental illness over the past 12 months?
 - ▶ How many visits did you have with the [health care provider]?
 - ▶ What was the average length of time spent with the [health care provider] per visit?

Data

- ▶ Do you have insurance that covers all or part of the price for prescription medications?
- ▶ CCHS-MH also contains information on health, socioeconomic status, social supports, and demographic information.

Methods

I consider four models for estimating the effect of private supplemental insurance on mental health care utilization:

1. The effect of insurance on a binary use/no use measure of prescription drug utilization.
2. Conditional on having taken a medication, I examine how insurance influences the number of medications taken.
3. The impact of insurance on a binary use/no use measure of mental health care providers.
4. Conditional on having visited a health care provider, I examine how insurance influences the number of hours spent with a given health care provider.

Methods: Discrete outcomes

- ▶ Models 1 to 3 have discrete outcome variables.
- ▶ Suppose we have a binary outcome variable $Y \in \{0, 1\}$ and a predictor variable X .
- ▶ We are often interested in estimating the conditional mean (or average) of Y given X or $E(Y|X)$.
- ▶ When Y is binary, $E(Y|X) = Pr(Y = 1|X) \equiv$ The probability that $Y = 1$, given X .

Methods: Discrete outcomes

- ▶ Typically this problem is estimated using a Logit or a Probit, setting $Pr(Y = 1|X)$ to follow a cumulative distribution function (CDF).
 - ▶ Gaussian CDF for Probit
 - ▶ Logistic CDF for Logit
- ▶ If the CDF is misspecified, the results will be untrustworthy.
- ▶ Instead, one can use a nonparametric conditional probability distribution function estimator
 - ▶ Makes no functional form assumptions
 - ▶ Free from misspecification.

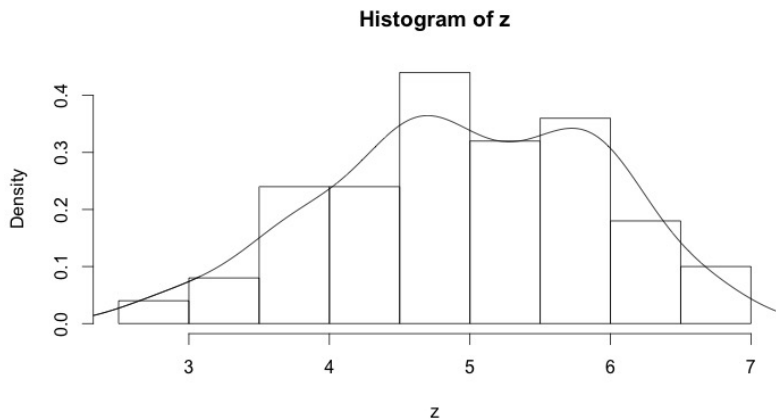
Nonparametric Conditional Density Estimation

- ▶ Letting $f(Y|X)$, $f(Y, X)$, and $f(X)$ denote the conditional PDF of Y given X , the joint probability of X and Y , and the marginal density of X , respectively, then:

$$f(Y|X) = \frac{f(Y, X)}{f(X)}.$$

Nonparametric Conditional Density Estimation

The methods I use are kernel estimation methods. For some variable z the kernel density estimator $\hat{f}(z)$ looks like:



Nonparametric Conditional Density Estimation

- ▶ Replace $f(Y, X)$, and $f(X)$ by their respective kernel density estimators, $\hat{f}(Y, X)$ and $\hat{f}(X)$, respectively.
- ▶ The conditional density estimator is then given by:

$$\hat{f}(Y|X) = \frac{\hat{f}(Y, X)}{\hat{f}(X)}$$

- ▶ Can estimate $f(Y = 1|X)$
- ▶ For $Y \in \{0, 1, 2, 3, \dots\}$, one can compute $f(Y = 1|X)$, $f(Y = 2|X)$, $f(Y = 3|X)$, etc.

Nonparametric Regression

- ▶ Model 4 has a continuous outcome variable.
- ▶ Let Y^C denote a continuous outcome variable.
- ▶ Mathematical definition of conditional mean function is:

$$E(Y^C|X) = \int Y f(Y^C|X) dy = \int Y \frac{f(Y^C, X)}{f(X)} dy$$

- ▶ Substituting $\hat{f}(Y^C|X)$ for $f(Y^C|X)$ gives:

$$\hat{E}(Y^C|X) = \sum_{i=1}^n Y_i^C W_i$$

where W_i is a weight variable made up of kernel functions.

Outcome Variables

- ▶ I consider four categories of medication:
 1. Antidepressants (ADEP)
 2. Antipsychotics (APSY)
 3. Benzodiazepines (anti-anxiety) (BENZ)
 4. Any medication (3 above plus other drugs, e.g. drugs for alcohol dependence)

- ▶ I consider three types of providers:
 1. Psychiatrist
 2. General practitioner (GP)
 3. Psychologists

Predictor Variables

- ▶ Private insurance
- ▶ Mental health status
 - ▶ Depression
 - ▶ Anxiety
 - ▶ Self-assessed mental health (SAMH)
- ▶ Health Status
 - ▶ Self-assessed health (SAH)
 - ▶ Comorbid condition
 - ▶ Overweight
 - ▶ Smoker Type
- ▶ Demographic variables
 - ▶ Age
 - ▶ Sex
 - ▶ Marital Status
 - ▶ Immigrant status
 - ▶ Urban/rural

Predictor Variables

- ▶ Socioeconomic variables
 - ▶ Family-adjusted income
 - ▶ Education level
- ▶ Social Provision Score (SPS)

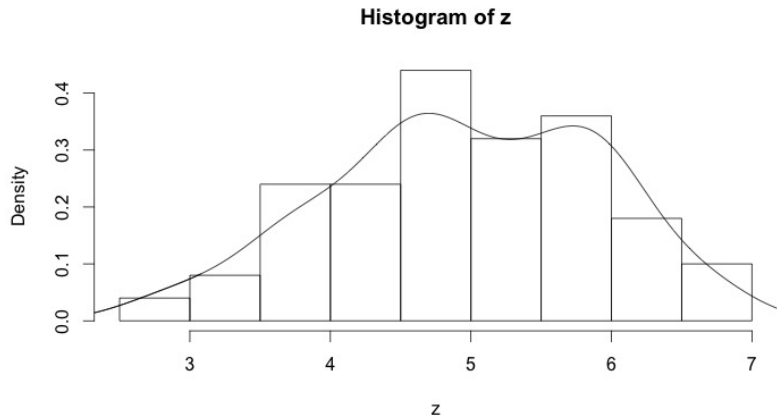
Models

- ▶ Let X represent variables on insurance, health, socioeconomic status, social supports, and demographic information.

Model	Object of interest	Sample
1	$f(\text{Used [drug type]} = \text{Yes} X)$	Full
2	For ADEP, APSY, and BENZ $f(\text{No. of [drug type]} \geq 2 X, \text{Used [drug type]} = \text{Yes})$ For Any Medication $f(\text{No. of [drug type]} = 1 X, \text{Used [drug type]} = \text{Yes})$ $f(\text{No. of [drug type]} = 2 X, \text{Used [drug type]} = \text{Yes})$ $f(\text{No. of [drug type]} = 3 X, \text{Used [drug type]} = \text{Yes})$ $f(\text{No. of [drug type]} \geq 4 X, \text{Used [drug type]} = \text{Yes})$	Subset
3	$f(\text{Visited [Provider]} = \text{Yes} X)$	Full
4	$E(\text{No. of Hrs with [Provider]} X, \text{Visited [Provider]} = \text{Yes})$	Subset

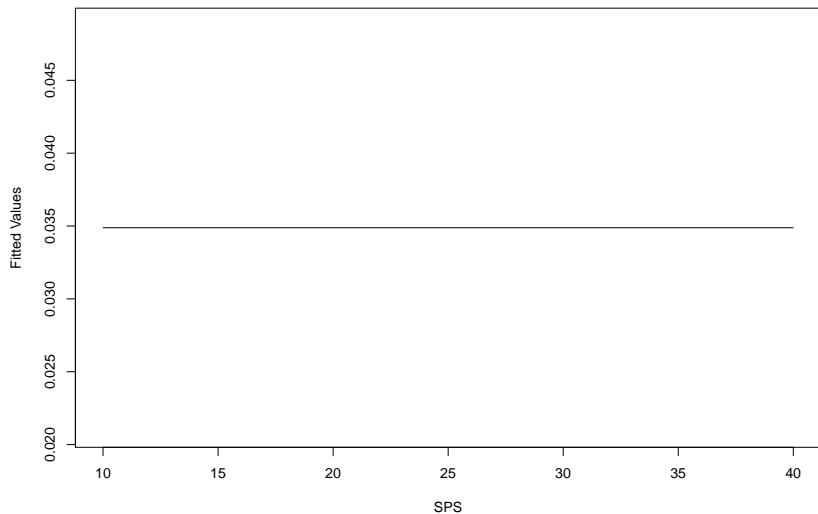
Bandwidth Selection

Bandwidths are the widths of the bars of the smooth histogram



Bandwidth Selection

$\hat{f}(\text{Visited Psychologist} = \text{YES} | X)$ Versus SPS



Results: Descriptive Statistics

Used a Medication in the Past Two Days

Variable Description	Percent
Antidepressant	
Yes	5.50
No	94.50
Antipsychotic	
Yes	0.90
No	98.61
Benzodiazepines	
Yes	1.30
No	98.70
Any drug	
Yes	6.70
No	93.30

Results: Descriptive Statistics

Number of Medications Used in the Past Two Days

Variable Description	Sample Size	Percent
No. of Antidepressants	1562	
1		85.82
2 or more		14.18
No. of Antipsychotics	313	
1		82.50
2 or more		17.50
No. of Benzodiazepines	483	
1		90.00
2 or more		10.00
No. of Medications	1993	
1		65.40
2		18.70
3		5.40
4 or more		2.90

Results: Descriptive Statistics

Visited a Health Care Professional in the Past 12 Months

Variable Description	Percent
Visited a psychiatrist	
Yes	2.00
No	97.99
Visited a GP	
Yes	6.80
No	93.20
Visted a psychologist	
Yes	2.21
No	97.78

Results: Descriptive Statistics

Number of Hours Spent with Health Care Professional

Variable Description	Sample Size	Mean	Std. Dev.
Hrs with a psychiatrist	639	14.37	103.4
Hrs with a GP	1901	98.64	33.5
Hrs with a psychologist	632	14.40	40.5

Results: Descriptive Statistics

Variable Description	Percent
Insurance	
Yes	77.9
No	22.1
Depression	
Yes	5.16
No	94.84
Anxiety	
Yes	2.26
No	97.74
Comorbid condition	
Yes	57.01
No	42.99

Variable Description	Percent
SAMH	
Poor	1.30
Fair	5.49
Good	26.61
Very Good	41.69
Excellent	24.92
SAH	
Poor	1.53
Fair	7.03
Good	28.48
Very Good	40.50
Excellent	22.45

Results: Descriptive Statistics

Variable Description	Percent
Smoker Type	
Daily	15.50
Occassional	5.50
Former Daily	23.20
Former Occassional	15.70
Never	40.10
Overweight	
Yes	43.87
No	56.13
Sex	
Male	49.3
Female	50.7

Variable Description	Percent
Marital Status	
Married	58.67
Common Law	13.47
Widdower	1.33
Separated/divorced	4.83
Single	21.71
Immigrant	
Yes	25.12
No	74.88
Urban	
Yes	71.24
No	28.76

Results: Descriptive Statistics

Variable Description	Percent
Education	
< high school	15.66
High School	15.26
Some post sec.	6.97
Post Sec. Grad	62.11

Variable Description	Mean	Std. Dev.
Age (Years)	43.86	16.96
Adjusted-family income (\$)	47,652.26	53,576.59
Social provision score	36.26	4.15

Results: Binary Use/No Use of Medications

Percent Change in $\hat{f}(\text{Used Med.} = \text{YES}|X)$ Versus Discrete Predictors

Variable	Anti-Depressants	Anti-Psychotics	Benzodiazepines	Any
Insurance				
Yes	13.48	100.03	0	11.72
Depression				
Yes	2.1	2.22	0.33	1.57
Anxiety				
Yes	0.2	0	1.37	0.26
SAH				
Poor	0.81	-54.26	14.43	-3.08
Fair	2.01	-33.9	38	-2.97
Good	5.03	-59.21	31.35	0.07
Very Good	-6.17	-68.27	-54.29	-11.01
SAMH				
Poor	1518.88	34801.17	749.27	1801.01
Fair	1308.77	5167.88	459.78	1407.42
Good	743.58	2364.07	183.71	794.17
Very Good	256.3	585.69	58.5	275.25

Results: Binary Use/No Use of Medications

Percent Change in $\hat{f}(\text{Used Med.} = \text{YES}|X)$ Versus Discrete Predictors (Cont'd)

Variable	Anti-Depressants	Anti-Psychotics	Benzodiazepines	Any
Comorbid Condition				
Yes	494.62	720.12	274.63	513.72
Smoker Type				
Daily	7.37	-6.7	-0.43	8.2
Occasional	7	-4.71	-6.28	5.85
Former Daily	9.58	19.07	-4.37	8.89
Former Occasional	21.56	-13.48	-0.58	18.45
Overweight				
Yes	4.48	0	0	1.95
Sex				
Male	-43.18	9.2	-74.33	-33.78
Marital Status				
Common-Law	0.57	-35.23	5.53	1.99
Widowed	8.54	-3.13	11.78	9.96
Divorced	6.08	-17.17	4.15	5.73
Single	-0.99	-18.11	1.39	-0.97

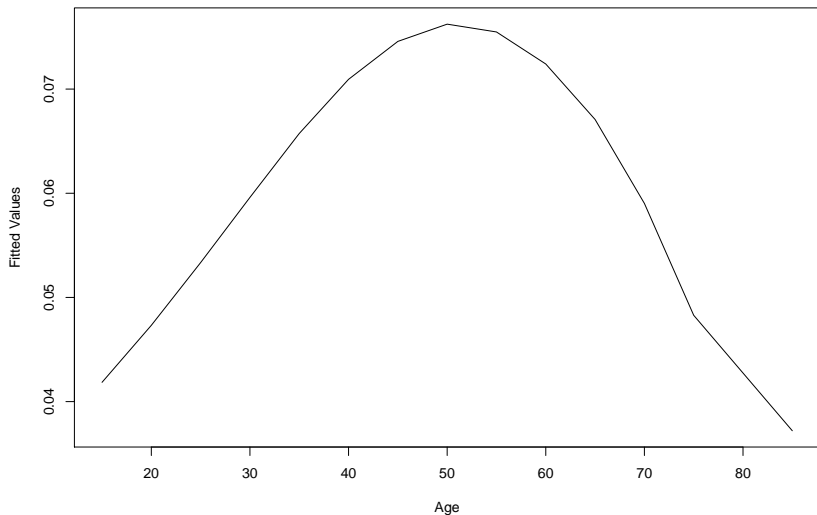
Results: Binary Use/No Use of Medications

Percent Change in $\hat{f}(\text{Used Med.} = \text{YES}|X)$ Versus Discrete Predictors (Cont'd)

Variable	Anti-Depressants	Anti-Psychotics	Benzodiazepines	Any
Immigrant Yes	-38.54	14.69	-80.28	-32.22
Education				
Secondary	-9.5	-11.77	22.04	-12.53
Some Post Sec.	-10.4	-1.68	-22.77	-14.13
Post Sec. Grad	1.99	-9.02	1.02	-0.65
Urban Yes	0.23	0	0.38	0.18

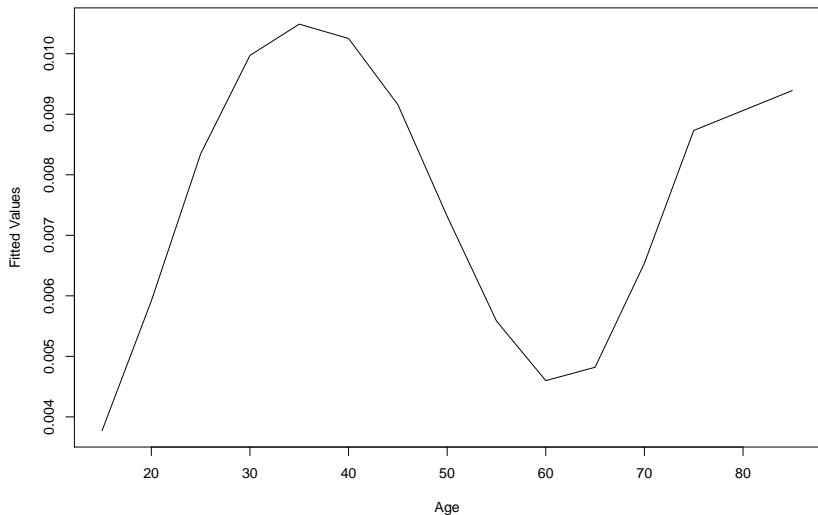
Results: Binary Use/No Use of Medications Versus Age

$\hat{f}(\text{Used Antidepressant} = \text{YES} | X)$ Versus Age



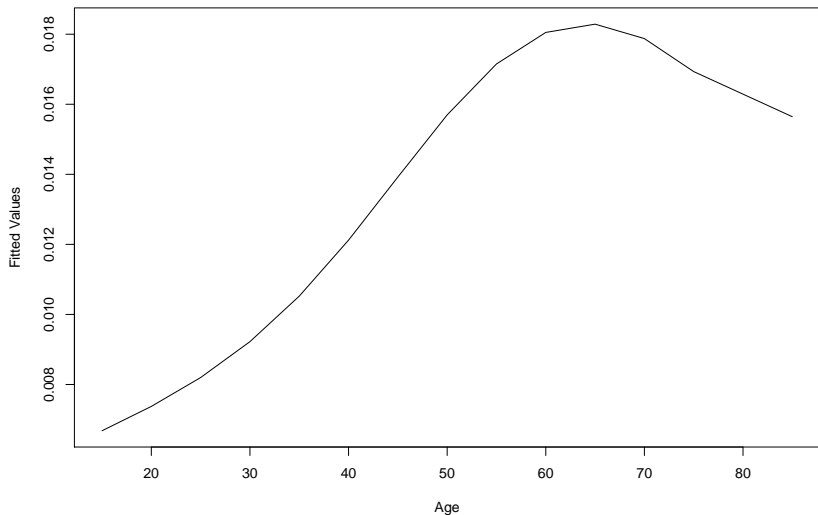
Results: Binary Use/No Use of Medications Versus Age

$\hat{f}(\text{Used Antipsychotics} = \text{YES} | X)$ Versus Age



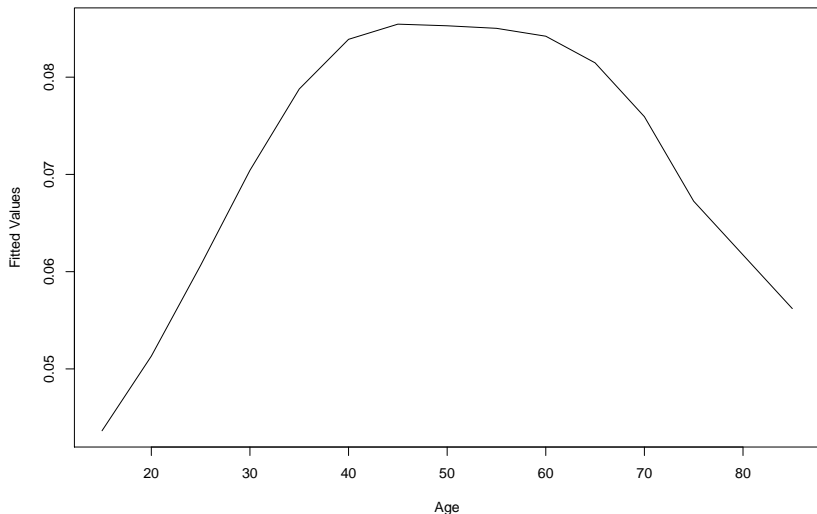
Results: Binary Use/No Use of Medications Versus Age

$\hat{f}(\text{Used Benzodiazepine} = \text{YES}|X)$ Versus Age



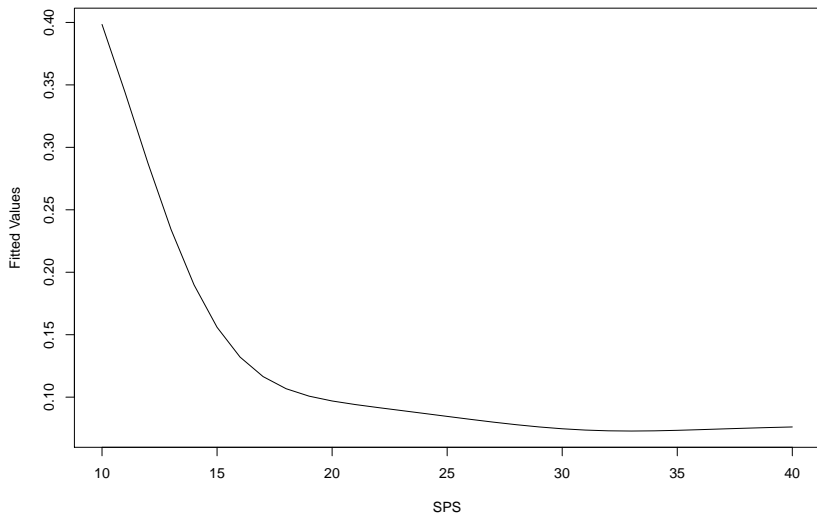
Results: Binary Use/No Use of Medications Versus Age

$\hat{f}(\text{Used Any Medication} = \text{YES} | X)$ Versus Age



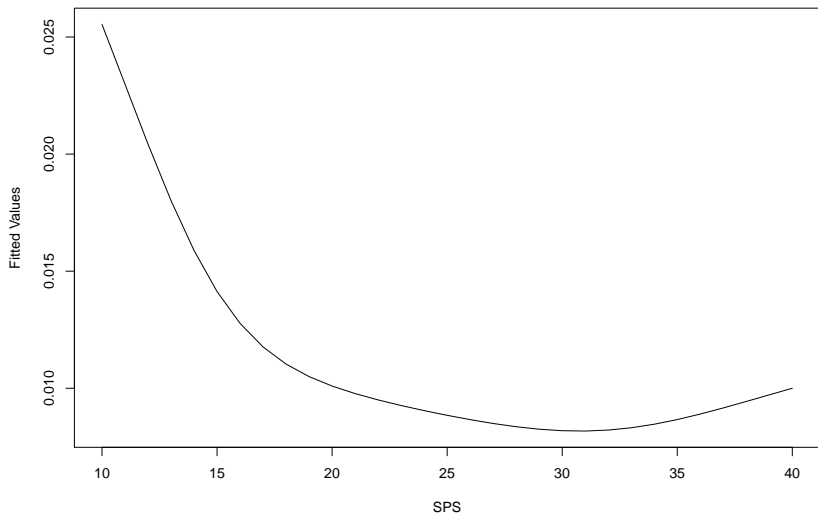
Results: Binary Use/No Use of Medications Versus SPS

$\hat{f}(\text{Used Antidepressant} = \text{YES} | X)$ Versus SPS



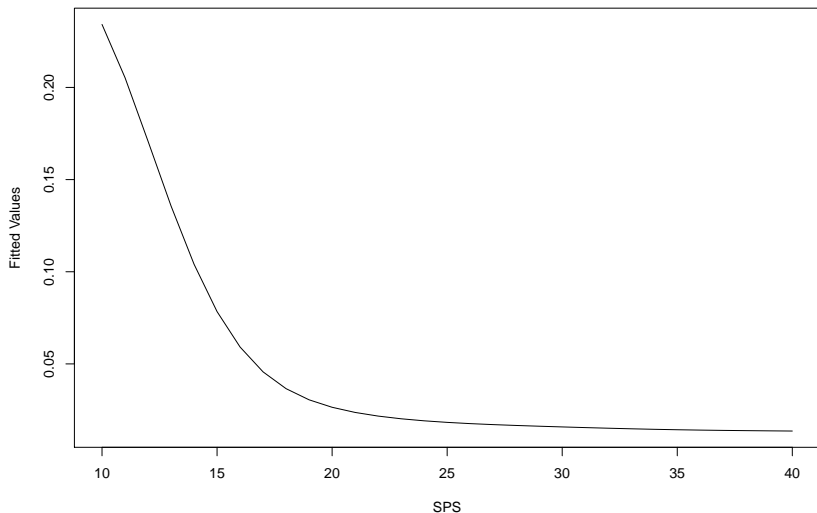
Results: Binary Use/No Use of Medications Versus SPS

$\hat{f}(\text{Used Antipsychotic} = \text{YES} | X)$ Versus SPS



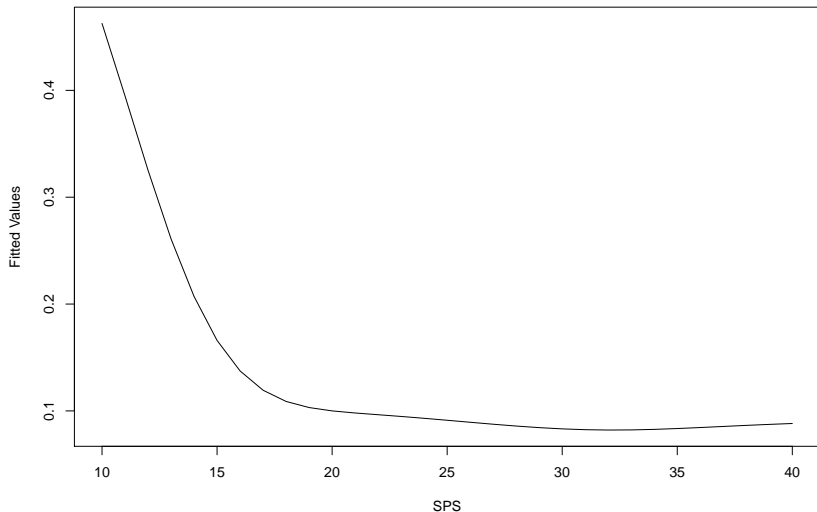
Results: Binary Use/No Use of Medications Versus SPS

$\hat{f}(\text{Used Benzodiazepine} = \text{YES} | X)$ Versus SPS



Results: Binary Use/No Use of Medications Versus SPS

$\hat{f}(\text{Used Any Medication} = \text{YES} | X)$ Versus SPS



Results: Binary Use/No Use of Medications

- ▶ Family-adjusted income was not relevant in predicting $\hat{f}(\text{Used Meds} = \text{Yes}|X)$ for all categories of pharmaceuticals.

Results: Number of Medications

% Change in \hat{f} (No. of Meds $\geq 2|X$, Used Med.=YES), For ADEP, APSY, and
BENZ

Variable	Antidepressants ($n = 1562$)	Antipsychotics ($n = 313$)	Benzodiazepines ($n = 483$)
Insurance			
Yes	4.74	43.87	424.30
Depression			
Yes	13.47	-8.39	120.64
Anxiety			
Yes	6.46	0.00	9.40
SAH			
Poor	7.03	192.26	576.52
Fair	12.61	113.00	-1.72
Good	2.50	163.64	-50.89
Very Good	2.55	98.47	68.34
SAMH			
Poor	2.80	5.80	-3.73
Fair	-0.43	4.61	35.81
Good	9.94	-9.09	-13.97
Very Good	-3.97	-3.33	-12.66

Results: Number of Medications

% Change in \hat{f} (No. of Meds $\geq 2|X$, Used Med.=YES), For ADEP, APSY, and BENZ (Cont'd)

Variable	Antidepressants (<i>n</i> = 1562)	Antipsychotics (<i>n</i> = 313)	Benzodiazepines (<i>n</i> = 483)
Comorbid Condition			
Yes	0.00	672789.50	0.00
Smoker Type			
Daily	3.61	-19.10	-40.24
Occasional	-0.44	-8.93	-29.21
Former Daily	-0.11	-10.12	-28.79
Former Occasional	1.93	1.45	-32.26
Overweight			
Yes	0.00	20.82	0.00
Sex			
Male	-16.60	0.00	0.00
Marital status			
Common-Law	0.00	0.00	0.00
Widowed	0.00	0.00	0.00
Divorced	0.00	0.00	0.00
Single	0.00	0.00	0.00

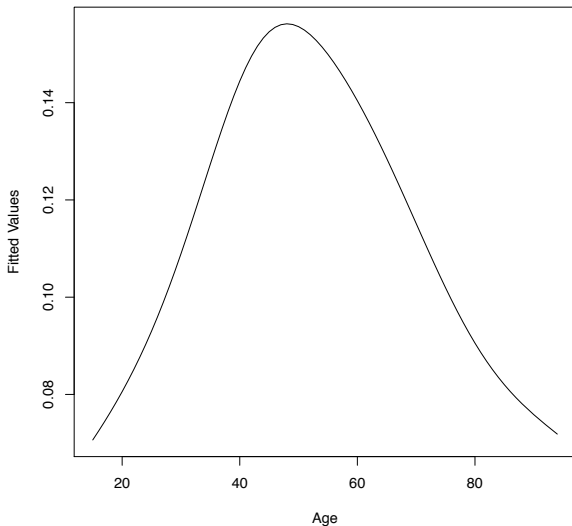
Results: Number of Medications

% Change $\hat{f}(\text{No. of Meds} \geq 2 | X, \text{Used Med.} = \text{YES})$, For ADEP, APSY, and BENZ (Cont'd)

Variable	Antidepressants ($n = 1562$)	Antipsychotics ($n = 313$)	Benzodiazepines ($n = 483$)
Immigrant			
Yes	0.26	0.00	0.00
Education			
Secondary	-2.01	44.72	-6.66
Some Post Sec.	-0.34	27.56	45.47
Post Sec. Grad	-2.74	29.98	3.19
Urban			
Yes	0.00	-55.22	0.00

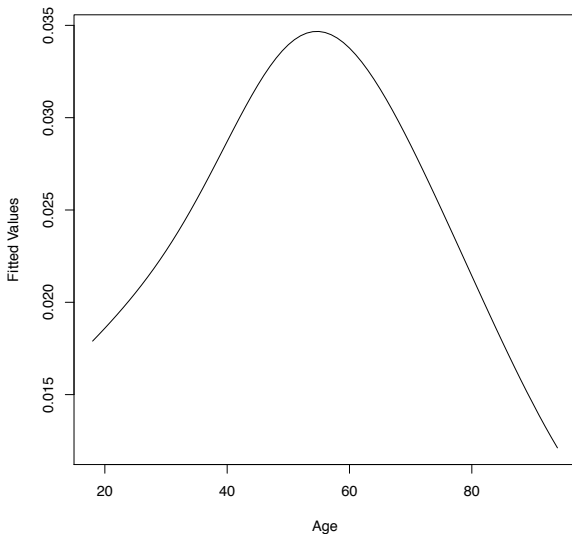
Results: Number of Medications Versus Age

$\hat{f}(\text{No. of Antidepressants} \geq 2 | X, \text{ Used Antidepressant} = \text{YES})$ Versus Age



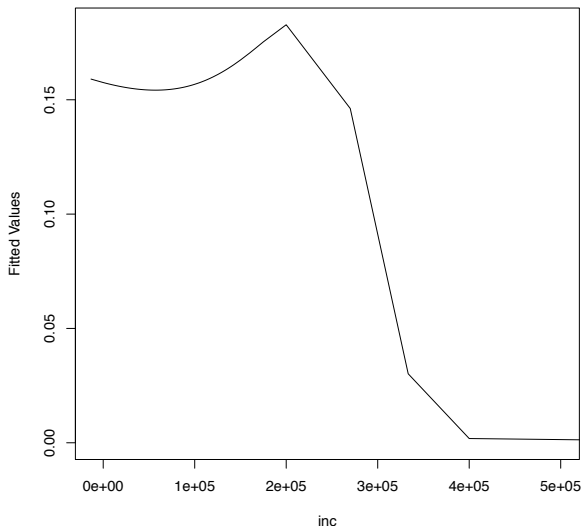
Results: Number of Medications Versus Age

\hat{f} (No. of Benzodiazepine $\geq 2|X$, Used Benzodiazepine=YES) Versus Age



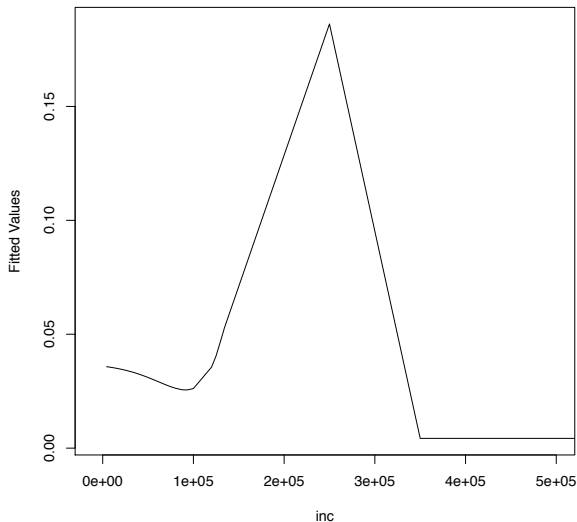
Results: Number of Medications Versus Adjusted Income

\hat{f} (No. of Antidepressants $\geq 2|X$, Used Antidepressant=YES) Versus Adjusted Income



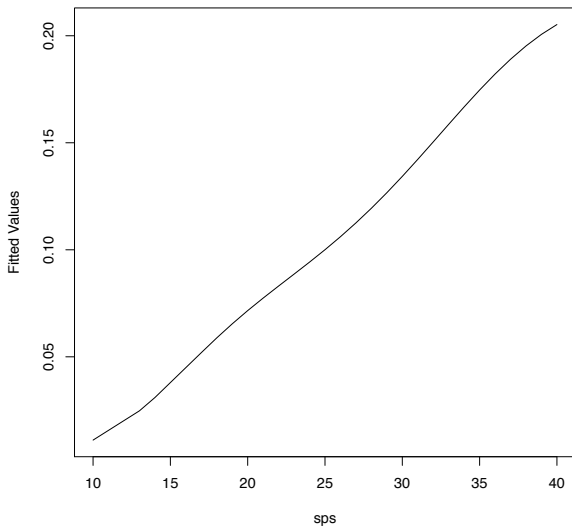
Results: Number of Medications Versus Adjusted Income

\hat{f} (No. of Benzodiazepine $\geq 2|X$, Used Benzodiazepine=YES) Versus Income



Results: Number of Medications Versus SPS

$\hat{f}(\text{No. of Antipsychotics} \geq 2 | X, \text{ Used Antipsychotic} = \text{YES})$ Versus SPS



Results: Number of Medications

- ▶ Age and family-adjusted income were irrelevant in predicting the use of two or more antipsychotics.
- ▶ Social provision score was irrelevant in predicting the use of two or more antidepressants or benzodiazepines.

Results: Number of Medications

Percent Change in \hat{f} (No. of Meds|X, Used Med.=YES), For Any Medication

Variable	(n = 1993)			
	Y = 1	Y = 2	Y = 3	Y \geq 4
Insurance				
Yes	-2.21	3.42	7.61	10.66
Depression				
Yes	-1.2	1.93	10.19	100
Anxiety				
Yes	-0.11	0.17	0.84	13.55
SAH				
Poor	-4.39	8.14	47.56	241.28
Fair	-6.12	17.8	30.03	26.95
Good	-4.66	13.33	16.88	20.66
Very Good	1.48	-2.46	-17.9	-18.88
SAMH				
Poor	-6.47	8.76	61.24	856.57
Fair	-2.54	3.06	26.27	189.45
Good	-5.96	12.98	32.89	-9.76
Very Good	-1.76	9.96	-11.23	-14.82

Results: Number of Medications

Percent Change \hat{f} (No. of Meds|X, Used Med.=YES), For Any Medication
(Cont'd)

Variable	(n = 1993)			
	Y = 1	Y = 2	Y = 3	Y ≥ 4
Comorbid Condition				
Yes	-9.39	24.36	43.05	164.62
Smoker Type				
Daily	-0.15	-5.81	33.52	74.66
Occasional	0.52	-3.06	9.27	72.32
Former Daily	0.27	-2.44	10.64	25.58
Former Occasional	-0.75	2.58	2.42	-8.09
Overweight				
Yes	-1.94	6.28	10.55	-44.6
Sex				
Male	0	0	0	0
Marital status				
Common-Law	-0.03	4.84	-23.16	-72.88
Widowed	0.21	-4.73	10.23	-52.08
Divorced	-4.42	12.02	6.42	-55.33
Single	-2.77	8.89	-3.79	-49.94

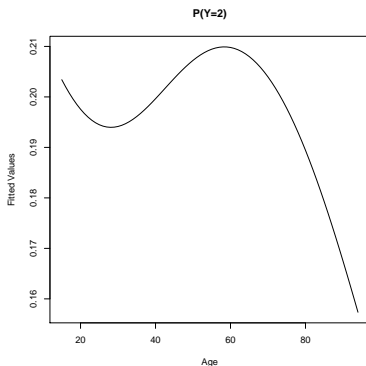
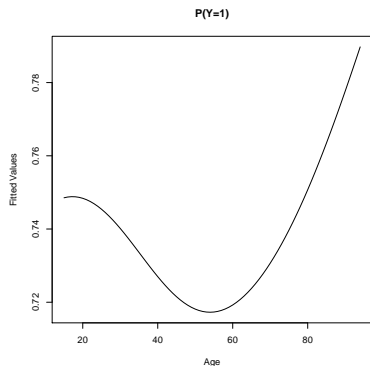
Results: Number of Medications

Percent Change in \hat{f} (No. of Meds|X, Used Med.=YES), For Any Medication
(Cont'd)

Variable	(n = 1993)			
	Y = 1	Y = 2	Y = 3	Y ≥ 4
Immigrant				
Yes	0.12	-0.19	-0.51	-1.48
Education				
Secondary	-0.91	3.67	6.12	103.65
Some Post Sec.	0.62	-1.26	4.81	14.88
Post Sec. Grad	-1.72	1.8	34.99	20.91
Urban				
Yes	0	0	0	0

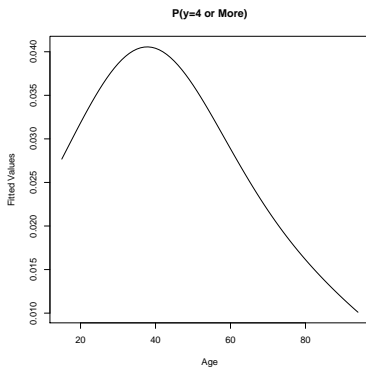
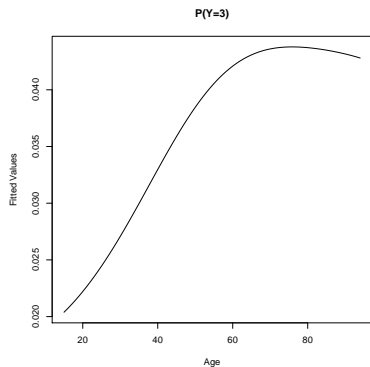
Results: Number of Medications Versus Age

\hat{f} (No. of Any Drugs|X, Used Any Drug=YES) Versus Age



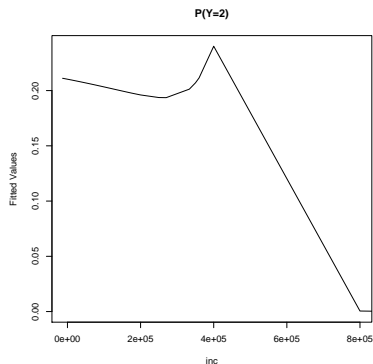
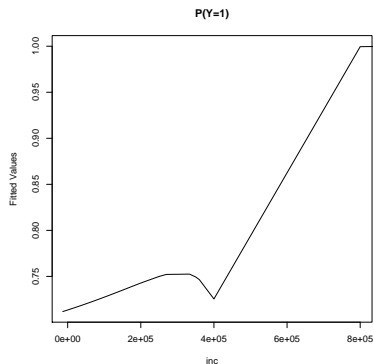
Results: Number of Medications Versus Age

\hat{f} (No. of Any Drugs|X, Used Any Drug=YES) Versus Age



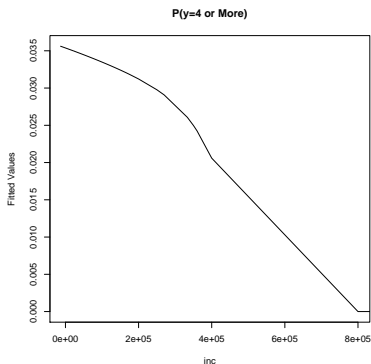
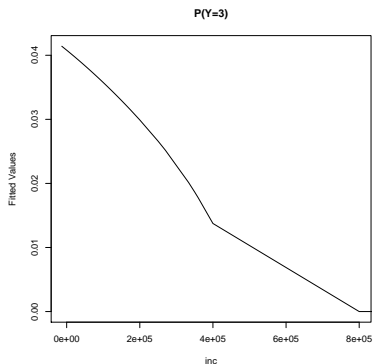
Results: Number of Medications Versus Adjusted Income

\hat{f} (No. of Any Drugs| X , Used Any Drug=YES) Versus Adjusted Income



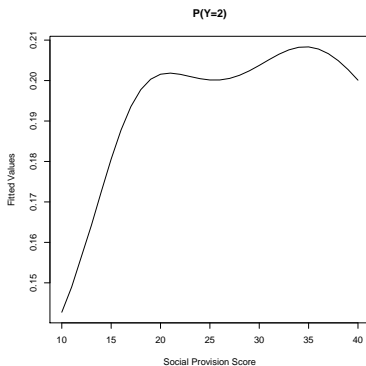
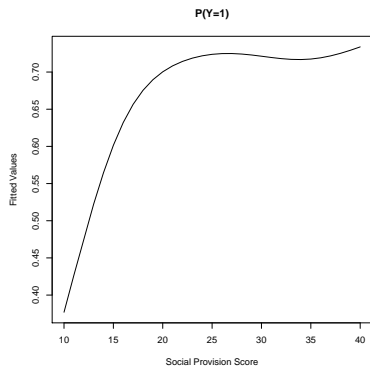
Results: Number of Medications Versus Adjusted Income

\hat{f} (No. of Any Drugs|X, Used Any Drug=YES) Versus Adjusted Income



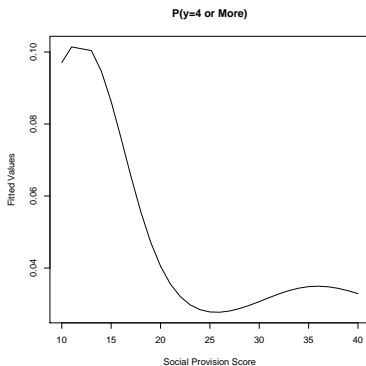
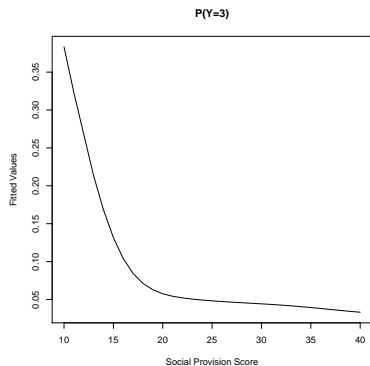
Results: Number of Medications Versus SPS

\hat{f} (No. of Any Drugs|X, Used Any Drug=YES) Versus SPS



Results: Number of Medications Versus SPS

\hat{f} (No. of Any Drugs|X, Used Any Drug=YES) Versus SPS



Results: Binary Use/No Use of Health Care Provider

Percent Change in \hat{f} (Visited Provider = YES|X) Versus Discrete Predictors

Variable	Psychiatrist	GP	Psychologist
Insurance			
Yes	2.02	0	21.77
Depression			
Yes	1095.62	0.69	485.44
Anxiety			
Yes	977.9	0.03	305.39
SAH			
Poor	-9.39	0.02	9.66
Fair	-8.36	0.02	11.77
Good	-8.19	0.03	21.75
Very Good	-14.74	0	7.15
SAMH			
Poor	34829.52	0.56	286.89
Fair	9558.06	0.61	384.41
Good	3092.78	0.43	216.93
Very Good	748.91	0.09	65.32

Results: Binary Use/No Use of Health Care Provider

Percent Change in $\hat{f}(\text{Visited Provider} = \text{YES}|X)$ Versus Discrete Predictors

Variable	Psychiatrist	GP	Psychologist
Comorbid Condition			
Yes	40.33	0	9.14
Smoker Type			
Daily	-32.37	0.01	-7.36
Occasional	-32.98	0.01	-13.48
Former Daily	-31.2	0.01	-12.04
Former Occasional	-39.39	0.03	-10.78
Overweight			
Yes	-0.09	0	0
Sex			
Male	8.19	0	-35.22
Marital Status			
Common-Law	-22.44	-0.01	-6.23
Widowed	-9.31	0.03	19.68
Divorced	-13.34	0.03	4.02
Single	-12.5	0.03	-2.24

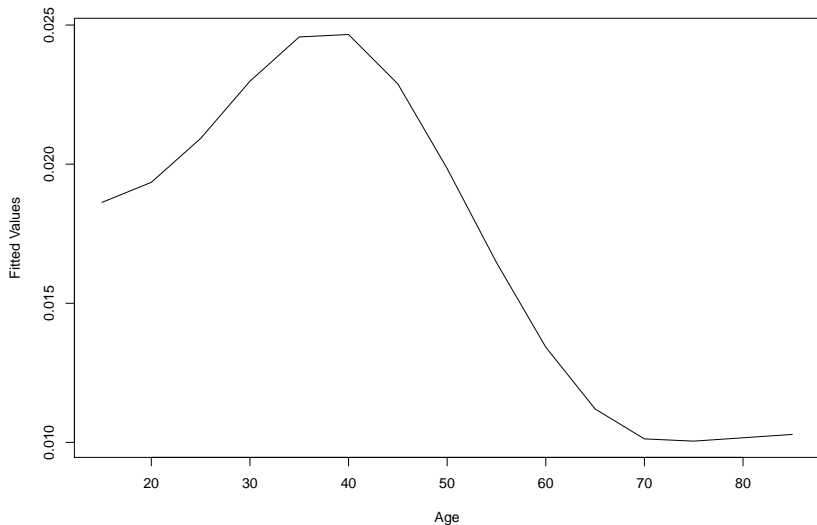
Results: Binary Use/No Use of Health Care Provider

Percent Change in \hat{f} (Visited Provider = YES|X) Versus Discrete Predictors

Variable	Psychiatrist	GP	Psychologist
Immigrant			
Yes	-5.5	0	-23.15
Education			
Secondary	-1.23	-0.1	-39.16
Some Post Sec.	22.83	-0.08	-35.03
Post Sec. Grad	18.39	-0.02	15.4
Urban			
Yes	0	0	0

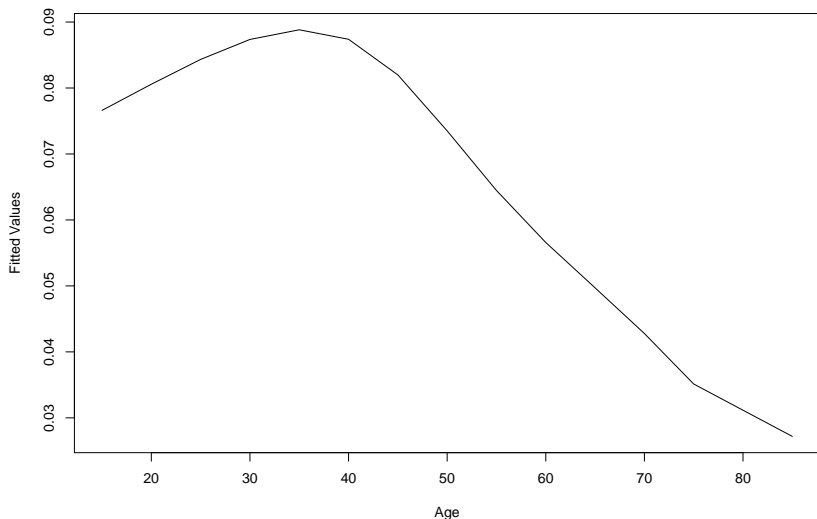
Results: Binary Use/No Use of Provider Versus Age

$\hat{f}(\text{Visited Psychiatrist} = \text{YES}|X)$ Versus Age



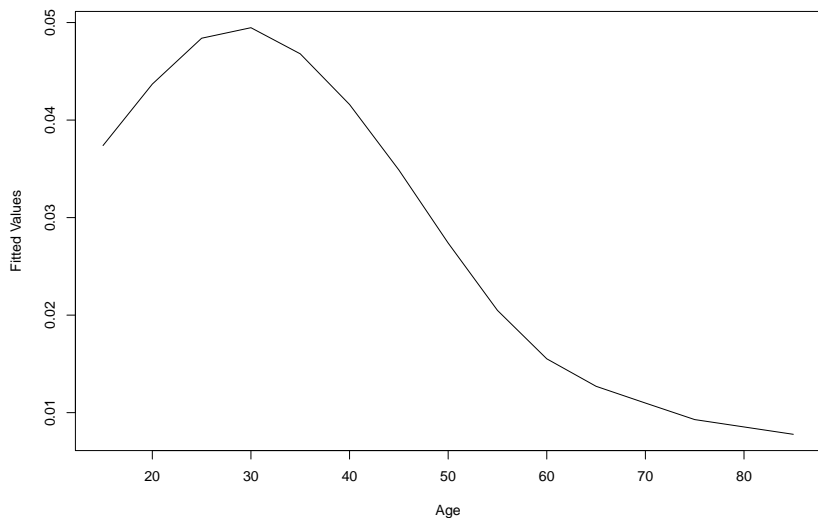
Results: Binary Use/No Use of Provider Versus Age

$\hat{f}(\text{Visited GP} = \text{YES} | X)$ Versus Age



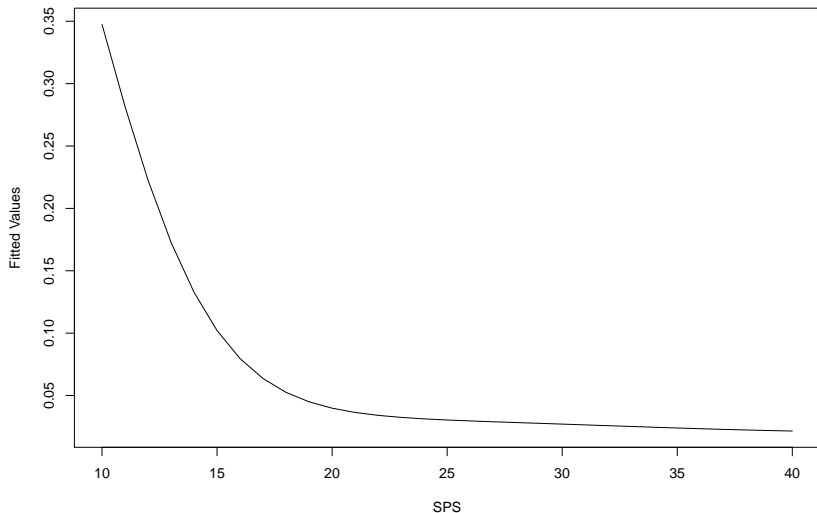
Results: Binary Use/No Use of Provider Versus Age

$\hat{f}(\text{Visited Psychologist} = \text{YES} | X)$ Versus Age



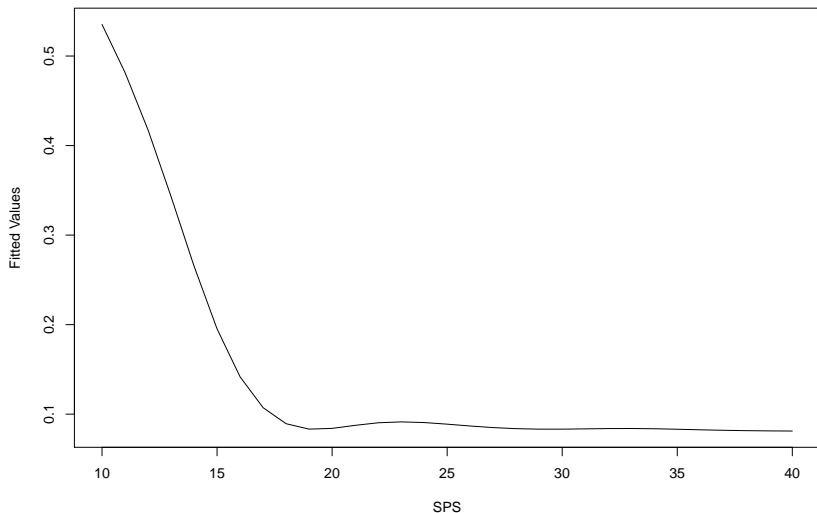
Results: Binary Use/No Use of Provider Versus SPS

$\hat{f}(\text{Visited Psychiatrist} = \text{YES} | X)$ Versus SPS



Results: Binary Use/No Use of Provider Versus SPS

$\hat{f}(\text{Visited GP} = \text{YES}|X)$ Versus SPS



Results: Binary Use/No Use of Provider

- ▶ Family-adjusted income was irrelevant in the prediction of visiting all categories of health care providers
- ▶ Social provision score was irrelevant in the prediction of visiting a psychologist.

Results: Hours Spent With Providers

Percent Change in Hours Spent With Health Care Providers (All other variables held constant)

Variable	Psychiatrist	GP	Psychologist
Insurance	8.96	1.41	12.91

Discussion

- ▶ Supplemental Insurance increased the likelihood of using antidepressants, antipsychotics, any medication for mental illness, and visiting a psychologist.
- ▶ Supplemental insurance also increased the likelihood of more medication and spending more time with a psychologist.
- ▶ Not certain whether this effect is due to moral hazard or due to need-based utilization.

Discussion

- ▶ Medium to strong social supports help reduce the likelihood of using mental health care goods and services.
- ▶ Similar to Mulvale and Hurley (2008) income was not relevant in predicting the likelihood of using medication.
- ▶ However, those with lower incomes are more likely to take a higher number of medications for mental illness.

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This work would not have been possible without help from the Department of Economics at Memorial University of Newfoundland and the CARE initiative. I would like to thank Wade Locke, Doug May, Scott Lynch, and Lynn Gambin for this opportunity.

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