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MENTAL ILLNESS AND THE DEMAND FOR ALCOHOL, COCAINE AND CIGARETTES

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ABSTRACT

The purpose of this paper is to estimate the effect that mental illness has on the demand for addictive goods. Mental illness could affect the level of consumption of addictive goods and could affect the price elasticities of addictive goods. Demand theory suggests that mental illness would affect consumption if mental illness affected marginal utility. In addition, mental illness would affect the price elasticity if mental illness affected the rate at which marginal utility diminishes. The empirical models allow for endogeneity between mental illness and addictive consumption since prior research suggests such a relationship. The results show that individuals with a history of mental illness are 25 percent more likely to consume alcohol, 69 percent more likely to consume cocaine and 94 percent more likely to consume cigarettes. Individuals with a history of mental illness are responsive to price although the price elasticites differ somewhat from whose without mental illness. These results provide an added justification for higher taxes and other supply reduction activities since they show that these policies are effective with this high participation group. The results also suggest that an additional method of reducing the consumption of addictive goods is to subsidize the treatment of mental illness.

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1. Introduction

While this paper is primarily intended for economists, the subject matter is, in part, usually the domain of psychologists. As such, some definitions are needed from the outset. The US Surgeon General (USDHHS, 1999) describes mental illness as abnormalities in cognition, emotion, mood and social function. Almost everyone experiences these problems to some degree. Mental illness is associated with an inappropriate level and duration of these problems. What is inappropriate, and what is not, is derived from social norms and is neither objective nor fixed. Despite these difficulties, a systematic approach to classification and diagnosis of mental illness has been developed by the American Psychiatric Association. The definition and criteria for diagnosis of specific mental illnesses are contained in the Diagnostic and Statistical Manual of Mental Disorders (DSM) (American Psychiatric Association, 1987). Substance abuse and substance dependence refer to specific disorders defined in the DSM. Economists generally use the term substance abuse more loosely to refer to a harmful level of consumption of addictive goods. Since this paper relies on the definitions of mental illness provided by the DSM, the term substance abuse is used only in its DSM context. However, mental illness is defined to exclude substance abuse and substance dependence disorders since the inclusion of these disorders would bias the mentally ill group to high addictive consumption.

Diagnosable mental illness affects about 24 percent of the US population in any given year, and about 43 percent of the population has had a diagnosable mental illness some time during their lives.[1] There is considerable correlation between mental illness and the consumption of addictive goods.[2] The 24 percent of the population with a current mental illness consumes

[1] This population excludes individuals who are institutionalized or homeless.
[2] Illicit drugs were limited to cocaine since the data set used in this study includes too few heroin users and there is very limited price data for other illicit drugs.

about 38 percent of all the alcohol, 44 percent of all the cocaine and 40 percent of all cigarettes. The 43 percent of the population who have had a period of mental illness sometime during their lives consumes about 69 percent of all the alcohol, 84 percent of all the cocaine and 68 percent of all cigarettes. Both consumption of addictive goods and mental illness are associated with increased levels of mortality, physical illnesses, non-fatal accidents, lost income, reduced productivity and emotional damage caused to children by afflicted parents (McGinnis and Foege, 1993, USDHHS, 1999).

The interaction between the consumption of addictive goods and mental illness is a complex process. Psychologists (see Kessler et al. 1996) have contributed greatly to this subject, while the economics literature makes very limited reference to it. However, economists have shown that price increases reduce the consumption of alcohol, illicit drugs, and tobacco as well as outcomes related to the consumption of these goods. Economists should therefore be interested in the interaction of mental illness and demand for these addictive goods. If mental illness alters demand, then the affected individuals may be more or less responsive to higher prices. If prices have less effect for this group, then treatment may be more important than tax increases and other supply reduction policies for the mentally ill. Alternatively, individuals with mental illness may be more affected by higher prices and be more responsive to tax increases and other supply reduction policies. If this is true, then it is an added justification for higher taxes and other supply reduction activities, since these policies target high consumption individuals.

There have been prior studies by psychologists of the causality between mental illness and addictive consumption. These studies suggest that causality between mental illness and addictive consumption may go in both directions.[3] Studies by Kessler et al. (1996) and Brady and Sonne (1999) find that individuals with mental illness are more likely to develop an alcohol

or illicit drug disorder than other individuals. However, a review by NIAAA (USDHHS, 1993) finds that alcohol use, at low doses may reduce certain psychiatric symptoms, but prolonged and high dose alcohol consumption can have the opposite effect. Also a note by Leshner (2001) argues that illicit drug use may be a factor in the onset of mental illness. A study by Lasser et al. (2000) finds that mental illness increases the likelihood that an individual will smoke. However, studies by Breslau and Klein (1999) and Wu and Anthony (1999) have found that tobacco can have a causal effect on mental illness. None of these studies, nor any other prior studies which account for mental illness, consider the potential effect of prices in altering the pathology of these comorbidities.

Prior studies of addictive consumption by economists have considered differentials in price elasticities by use level and by demographic variables. Studies of alcohol demand by Manning et. al. (1995) and Kenkel (1996) found that heavy drinkers were less responsive to price changes than moderate drinkers. A study by Grossman, Chaloupka and Sirtalan (1998) finds that heavy drinking by youth is more price responsive in the long run than in the short run. A study of alcohol and cocaine demand by Saffer and Chaloupka (1999) for a number of demographic groups finds negative price effects. Grossman and Chaloupka (1998) also found negative price elasticities in a study of cocaine consumption by youth. The Report of the Surgeon General (USDHHS, 2000) lists 38 studies which indicate that higher tobacco prices or taxes reduce smoking for various demographic groups. None of these studies, nor any other prior studies which account for price, consider the effects of mental illness.

This paper has two goals. The first goal is to empirically examine the effect of mental illness on the level of consumption of alcohol, cocaine and tobacco. Raw data indicate that mental illness is associated with higher consumption of addictive goods. This may be due to

[3] Some psychological dysfunctions are organic in nature and thus would not be related to addictive consumption.

uncontrolled factors such as income or education. The research in this paper examines the effect of mental illness holding other factors which affect addictive consumption constant and controlling for reverse causality. The second goal is to empirically estimate the price elasticity of alcohol, cocaine and tobacco for individuals with a history of mental illness.

2. The Empirical Model

Mental illness could affect the marginal utility derived from consumption of addictive goods. The reason for this is that consumption of addictive goods disrupts the flow of the neurotransmitter, dopamine. This disruption is believed to be responsible for producing feelings of pleasure and reward. Individuals with mental illness may derive a greater marginal utility from these chemically induced feelings of pleasure and reward since they mask the symptoms of mental illness. Mental illness could also affect the rate at which the marginal utility diminishes, but there are no a priori expectations about the direction.

A demand function can be derived from a utility function with an addictive good, a non-addictive good and mental illness as arguments. In this utility function the marginal utility of addictive consumption is assumed to be positive and diminishing and the marginal utility of mental illness is assumed to be negative. The demand function is derived using a quadratic utility function in Appendix I. The derivation shows that if mental illness increases the marginal utility from consumption of the addictive good, then consumption will be higher. The model also shows that if mental illness affects the rate at which marginal utility diminishes, then price responsiveness will be affected.

The empirical demand function takes the form:

$$A = A(M, P, I, Z), \quad (1)$$

where A is the addictive good, and M is mental illness, P is the price of the addictive good, I is income and Z are other relevant factors. Prior research has highlighted the potential endogeneity between mental illness and addictive consumption. To account for endogeneity requires specification of a probability of mental illness equation. The mental illness equation can be interpreted as a production function and is analogous to a physical health production function such as specified by Grossman (1972). In this case however, rather than physical, it is mental and rather than health, it is illness that is "produced".

$$M = M(A, H, L, Y) \qquad (2)$$

In this equation, mental illness is produced by the consumption of the addictive good, a family history of mental illness H, stressful life events L, and other factors Y. Considerable research (USDHHS, 1999, Kessler, 1997) shows that family history of mental illness and stressful life events have a causal relationship to mental illness.

3. Data

The empirical work employs the National Comorbidity Survey (NCS) with appended price data. The NCS was a congressionally mandated survey designed to study mental illness in the United States. The NCS uses the revised third edition DSM nomenclature to define mental illness. The survey, conducted in 1991, included 8,098 respondents, although only 5,877 respondents were asked more detailed questions on family background and stressful life events.[4] The NCS limited tobacco use questions to 4,411 respondents. Of these respondents, 2,897 were asked detailed questions on family background and stressful life events.

The NCS includes a series of detailed questions regarding alcohol, cocaine and tobacco consumption. These questions have been used to define alcohol, cocaine and tobacco

[4] The data include respondents from age 15 to 54 with a fixed residence. About 4 percent of the sample was interviewed in late 1990.

participation variables. These variables are each equal to zero for individuals who report that during the past 12 months they did not participate and otherwise are equal to one.

The price of alcohol was estimated from data taken from the Inter-City Cost of Living Index, published quarterly by the American Chamber of Commerce Researchers Association (ACCRA). The ACCRA data contain the price of standard brands of beer, wine and distilled spirits. The ACCRA sample only a few stores in each location. Since beer prices vary widely by store type and wine consumption is limited, distilled spirits price was selected as the price of alcohol. The alcohol price was matched to the individual records in the NCS by county FIPS code for 70 percent of the sample. Most of the remainder of the individuals were matched by using the price from a similarly sized community in the same state. Only 3.4 percent of the sample could not be matched by either method and were dropped from the alcohol regressions.

The price of cocaine was estimated from the US Department of Justice, Drug Enforcement Agency's STRIDE data set. The total cost, purity, weight and other information are recorded in the STRIDE data set. Total cost can not simply be divided by number of grams to get price because the price of a gram is lower for larger purchases. Variation in purity and imperfect information about purity on the part of purchasers further complicate the issue. A regression of the log of total cost on the log of weight, the log of purity, and dummy variables for city and year was estimated. Imperfect information about purity is addressed by predicting purity based on the other regressors. To identify the total cost model, the coefficient of the log of predicted purity is constrained to equal the coefficient of the log of weight. The log of the price of one gram of pure cocaine is then given as the sum of the intercept, the relevant city coefficients, and the relevant time coefficients. This procedure eliminated variations in price or unit cost due to variations in weight or purity. The anti-logarithm of this predicted price is the price of one unit of 100 percent pure cocaine. This price

was then divided by the intercity cost of living provided by the ACCRA. The cocaine price was matched to the individual records in the NCS by county FIPS code for 64.3 percent of the sample. The remainder of the individuals were matched by state using a weighted average price computed using the MSA's in the state.

The cigarette price data come from the Tobacco Institute and are matched to the NCS data by state. The price includes generic cigarettes and state and federal taxes. Since tax rates change during the year, a weighted average state and federal tax was used. The weights represent the proportion of the year the tax rate was in effect. The price and tax data are in cents per pack.

The component of the NCS that was used to collect data on mental illness is called the Composite International Diagnostic Interview (CIDI). The CIDI was developed by the National Institute of Health, the World Health Organization and the University of Michigan and is a non-clinician administered instrument which generates psychiatric diagnoses. The instrument has undergone extensive testing for reliability and validity. The CIDI includes an extensive series of questions which are used to define a series of dichotomous mental illness variables.[5] A series of 12 non-substance related disorder groups are defined in the data set. These disorders are defined for both past year occurrence and for occurrence anytime during the respondent's life. Two dichotomous mental illness variables were defined as equal to one for the occurrence of any of these 12 disorder groups during the past year and during the lifetime. The 12 disorder groups are listed and described in Appendix 2. In this paper, an individual is defined as having a mental illness if they met the criteria for any one of the 12 non-substance abuse disorders. Alcohol and drug abuse and dependence refer to specific disorders defined in the DSM and are not included

[5] These mental illness variables were created in a recode of the original data done by the University of Michigan. These mental illness variables are defined in accordance with DSM-III-R which was current during the data

in the definition of mental illness used in this paper. This distinction is necessary since the topic of this paper is the interaction of addictive consumption and non-substance related mental illness. Inclusion of addictive consumption disorders with other disorders would bias the mental illness group towards high addictive consumption. While mental illness is defined as a dichotomous variable, it is interpreted as an observable indicator for a continuous unobserved latent variable.

A series of demographic variables are also defined from data collected in the NCS. A set of dichotomous variables equal to one if the individual reports that they are Black is defined. Also, a dichotomous gender variable is defined. A dichotomous measure equal to one for those currently married or living together is also defined. Continuous age and age squared variables are defined. A dichotomous religion variable is defined as equal to one if the respondent indicates affiliation with any religion. Finally, a continuous income variable was defined.

The NCS data set also contains information on the individual's family history. There is evidence (Kendler and Prescott, 1998) that genetic factors can affect an individual's demand for addictive goods. Studies of genetic factors predict that a family history of addiction problems increases the probability of addiction problems.[6] However, the environmental link is ambiguous. Observing an alcohol or drug abusing parent may deter a child from following the same path. Dichotomous parent alcohol abuse and dichotomous parent drug abuse variables were defined. These variables are equal to one if the natural mother had a problem with alcohol or drugs.

A family history of mental illness can also affect an individual's probability of mental illness. However, this variable would not directly affect an individual's addictive consumption.

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collection period.

[6] Although the probability of addiction increases, most children brought up in a household with an alcohol or drug abusing parent do not become abusers themselves.

A dichotomous variable equal to one if the natural mother had periods of depression is also defined.[7]

The NCS data set also contains information on stressful life events which may have happened to the respondent. Ten stressful life event variables were defined. These variables include measures of: sexual abuse, loss of close relationship, death of a relative, legal problems, and poor physical health. Poor recall of events in the distant past or misreporting of these data are possible. Summary definitions and mean values for all variables used are presented in table 1. The means are presented in table 1 for the full sample as well as for those with and without past year and lifetime mental illness.

4. The Empirical Strategy

The empirical work presented in this paper is designed to estimate the effect of mental illness both on the level of consumption and price elasticity of alcohol, cocaine and tobacco. Neither question is ideally answered with a single estimation technique. Two stage least squares (TSLS) is an ideal technique for estimation of the effect of mental illness on addictive consumption, controlling for endogeneity and holding constant other factors such as demographic variables. Differential price elasticites can also be estimated with TSLS but this requires a mental illness interaction term which creates two endogenous right hand side variables. In addition, all of the variables in the demand function may differ between individuals with and without mental illness. To allow for this possibility, every variable would have to be interacted with mental illness creating a series of endogenous variables and an unlikely estimation problem. A more attractive method of estimating differential price elasticites is to divide the sample into two groups. The Heckman sample selection model is appropriate since

[7] There is a parallel question on father's depression but it has too many missing values for inclusion.

sample selection may be endogenous. This model allows for all the coefficients to differ between the two groups. Likelihood ratio tests can be performed to determine the need for estimation of separate equations. However, TSLS models are still preferred for answering the question about levels of consumption since selection models do not include a mental illness variable.[8] A comparison of constants from the selection model is imperfect since the constant term reflects the effects of all excluded variables. The best alternative is to include a variable for mental illness which is done in the TSLS models.

Identification is an important issue in the estimation of any simultaneous model. An intuitive understanding of identification in the model presented in this paper is dependent on the definition of mental illness. Since mental illness is not a usual variable in economic research, some added discussion of the concept may be useful. Mental illness is a common occurrence with about a quarter of the population affected each year and with many individuals recovering without any intervention. This is because mental illness includes minor as well as major problems. An extensive definition is presented in Appendix 2. The specification of equations 1 and 2 models the path of causation from a family history of mental illness and stressful life events to mental illness. That is, the mental illness problems of the parents and the individual's stressful life events will increase the probability of mental illness in the individual. The individual's probability of consuming addictive goods may increase as a result of mental illness. These relationships are illustrated in figure 1. This specification assumes that a family history of mental illness and stressful life events do not directly enter the addictive good demand function. These variables have an indirect affect on addictive consumption through their effect on mental illness. Family history and stressful life events have a direct effect on mental illness, and mental illness has a direct effect on addictive consumption.

[8]Lambda can be interpreted as proportional to the inverse of the probability that the individual is mentally ill.

An alternative view assumes that diagnosable mental illness is primarily a reflection of serious problems. In this case, some stressful life events might not precipitate mental illness but might increase the demand for addictive goods. In this alternative specification stressful life events enter both the addictive good demand function and the mental illness function. The path of causation is illustrated with a question mark in figure 1. This specification is identified since the price of the addictive good enters only the demand curve and a family history of mental illness enters only the mental illness function. For these instruments to be valid they should have no added effect in the structural addictive demand equation. The validity of this specification is examined with a test for an overidentfied model proposed by Davidson and MacKinnon (1993).

5. Results

The first empirical issue which needs to be addressed is the potential endogeneity of mental illness and addictive consumption. A Wu-Hausman test was performed for each of the three addictive goods to test for endogeneity. For each good, two sets of Wu-Hausman tests were performed by predicting both dependent variables with reduced form equations and including the predicted values, along with the actual values, in the structural equations.[9] Both structural equations were then estimated with OLS. The predicted mental illness variables were significant in the alcohol and cigarette demand functions, but not in the cocaine demand function. The second set of tests were performed by including the predicted addictive consumption variable in the mental illness structural equation. These tests never rejected exogeneity. However, since causality must go in either one or both directions, there is enough

[9] Angrist (2000) and Heckman and MaCurdy (1985) show that TSLS is an acceptable method of estimation in cases of endogenous dichotomous dependent variables. All of the functions were estimated with robust standard errors, clustered on state, to account for unobserved state level heterogeneity.

evidence to conclude that there is endogeneity with mental illness in cases of alcohol and cigarettes.

The failure to find evidence of endogeneity for cocaine might be due to the low prevalence of cocaine use. Only about two percent of the sample used cocaine in the past year. However, about 24 percent of the sample had a mental illness in the past year and 43 percent had a mental illness sometime during their lives. Even if every cocaine user were mentally ill they would comprise only eight percent of all past year mentally ill individuals and four percent of all lifetime mentally ill individuals. That is, cocaine use is so minor a factor compared to other causes of mental illness that the exogeneity hypothesis can not be rejected.

The first theoretical question that this paper seeks to answer is the effect of mental illness on alcohol, cocaine and cigarettes participation. To examine the effect of mental illness on addictive good participation, TSLS models were estimated for alcohol and cigarettes and probit models were estimated for cocaine. All of the demand functions include either a past year or lifetime mental illness variable. The results are presented in table 2. The mental illness coefficients represent the increase in the probability of participation when the dichotomous mental illness variable switches from zero to one. These coefficients are all positive and generally significant and are presented in table 2. A somewhat more intuitive concept results when the marginal effects are divided by the mean addictive good participation rate. The result is the percentage increase in the participation rate for those with mental illness over those without mental illness. Past year mental illness is found to increase alcohol participation by about 20 percent, and lifetime mental illness is found to increase alcohol participation by about 25 percent. For cocaine, the increases are 27 percent and 69 percent, respectively. For cigarettes, the increases are 86 percent and 94 percent, respectively.

The TSLS estimates also include the effects of price and other variables on addictive good participation. This is interesting because the NCS data have never been used to estimate addictive good demand functions. The price-participation elasticities are .43, .66 and .70, for alcohol, cocaine and cigarettes, respectively. The other independent variables are similar to prior empirical studies and are examined in the selection models presented below. One variable which has not been included in prior addictive demand studies is the effect of a family history of problems with the addictive good. The results show that a family history of alcohol problems has a positive effect on alcohol participation and a family history of drug problems has a positive effect on cocaine participation. There was no data on family history of problems with tobacco in the NCS data set.

The TSLS estimates can also be used to examine the alternative specification which includes stressful life events and family history of mental illness in both the demand and the mental illness functions. For these instruments to be valid they should have no added effect in the structural addictive demand equations. A test of validity proposed by Davidson and MacKinnon (1993) for an overidentfied model is to regress the residuals from the structural equation on the instrumental variables and calculate nR^2, which is distributed as a chi-squared density function. This test was performed for all addictive participation functions, and the null hypothesis of independence between the instrumental variables and the error term could not be rejected. That is, the exclusion of stressful life events and family history of mental illness in the addictive demand functions is valid. Additional estimation with this specification produced results that were very similar to the specification which excludes stressful life events from the demand functions. Based on these results, the alternative specification is rejected in favor of the specification which is presented in tables 2 through 5.

The second question that this paper seeks to answer is the effect of mental illness on alcohol, cocaine and cigarettes price elasticites. To answer this question Heckman selection models for alcohol, cocaine and cigarette participation were estimated. These results are presented in tables 3, 4 and 5, respectively.[10] Each table contains demand functions for those with and without both past year and lifetime mental illness. These tables also present the selection equation for past year and lifetime mental illness which is the reduced form mental illness equation from structural equations (1) and (2) described above. Each demand function contains the parameter, rho, which is proportional to the coefficient of lambda and measures the correlation between the error terms in the demand function and the selection equation. A significant value for rho is evidence of endogenous selection. Each table also presents the results for two likelihood ratio tests for each pair of demand functions. The first likelihood ratio statistic tests for a significant difference between the price coefficients and the second likelihood ratio statistic tests for a significant difference between the coefficients of all the included regressors.

The next empirical issue is whether different demand functions are needed for those with and without mental illness and if so, is selection endogenous? The likelihood ratio tests indicate that the demand functions in all cases are significantly different between the two groups. These results imply that separate demand functions for those with and without mental illness are needed. Rho is significant for one equation in the alcohol and cocaine regressions. For cigarettes, however, rho is significant in all equations. Since at least one demand function in each pair for alcohol and cigarettes shows evidence of endogenous selection, to be consistent, all

[10] Since these models all have dichotomous dependent variables in both the demand function and the selection function, they are estimated with the Heckprob procedure in Stata, using robust standard errors clustered on state.

regressions are estimated as endogenous selection models.[11] Inclusion of an insignificant lambda does not bias the other variables.

For alcohol participation, the price elasticites for both mental illness groups are larger than the corresponding coefficients for those without mental illness. For cocaine, one case has an insignificant price coefficient and should be ignored. In the other case, mental illness reduces price elasticity. For cigarettes the results are mixed, higher in one case and lower in the other. These results show that individuals with mental illness are price responsive and that the elasticities are not substantively different from those who are not in the mentally ill group.

It is also interesting to examine the marginal effects for the other independent variables since they also differ between those with and without mental illness. The most interesting results are for religious adherence and for family history. Religious adherence has a negative effect on addictive consumption and it is a larger negative effect for those with mental illness. Family history increases consumption of alcohol and cocaine for the mentally ill, but the effect tends to be weaker for those without mental illness. Gender, race, income, age and education mirror the results found in other studies of these goods with no systematic pattern across all three substances for those with and without mental illness.

Finally, tables 3, 4 and 5 present results for the mental illness reduced form equations. They are all very similar across the three substances and for past year and lifetime mental illness. These are interesting results since there are no prior studies of mental illness production functions in the health economics literature. Prior studies of mental illness in health economics have mostly considered treatment payment options or the effects of mental illness on income and

[11] The evidence of endogeneity between mental illness and addictive consumption is stronger than the evidence of endogenous selection. In the former case the problem is correlation of error terms across structural equations and in the latter case the problem is correlation between the error terms of a reduced form equation and a structural equation.

work. This prior work does point to the potential endogeneity between mental illness and some of the included variables. Since this paper focuses on addictive consumption, the potential endogeneity between mental illness and other variables such as income and education is not addressed. Because of these biases, these estimation results should be viewed as only suggestive of the relationships.

The mental illness reduced form equations correctly predict the dichotomous mental illness variables for about 70 percent of the sample. Income, education and marriage have a negative effect on mental illness. Age has a parabolic relationship to mental illness indicating that the onset of metal illness decreases after the age of 40. Women are more likely to have a current year mental illness than men. However, there is no gender difference for lifetime mental illness. Being black also has a negative effect on lifetime mental illness but no effect on past year mental illness. The other variables include family history of depression and stressful life events including poor physical health. A depressed mother has a significantly positive effect on mental illness. The stressful life events and poor physical health are generally positive and significant, although the effects are stronger for past year mental illness.

6. Conclusions

Economists have recommended price increases as a tool to reduce the consumption of addictive goods and their related costs. However, no research has specifically examined the interaction of price and mental illness on addictive consumption. The primary goals of this paper were to determine whether mental illness has any effect on the level of consumption of addictive goods or on the price elasticity of addictive goods. The empirical models allow for the possibility of endogeneity between mental illness and addictive consumption. The empirical

results show that mental illness increases participation in addictive goods and that mental illness has no substantive effect on the price elasticity. These results suggest that alcohol and tobacco taxes and drug interdiction are effective with this high participation group. The results also suggest that an additional method of reducing consumption of addictive goods is to treat, or subsidize the treatment of, mental illness.

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Figure 1
Hypothesized Causal Relationships

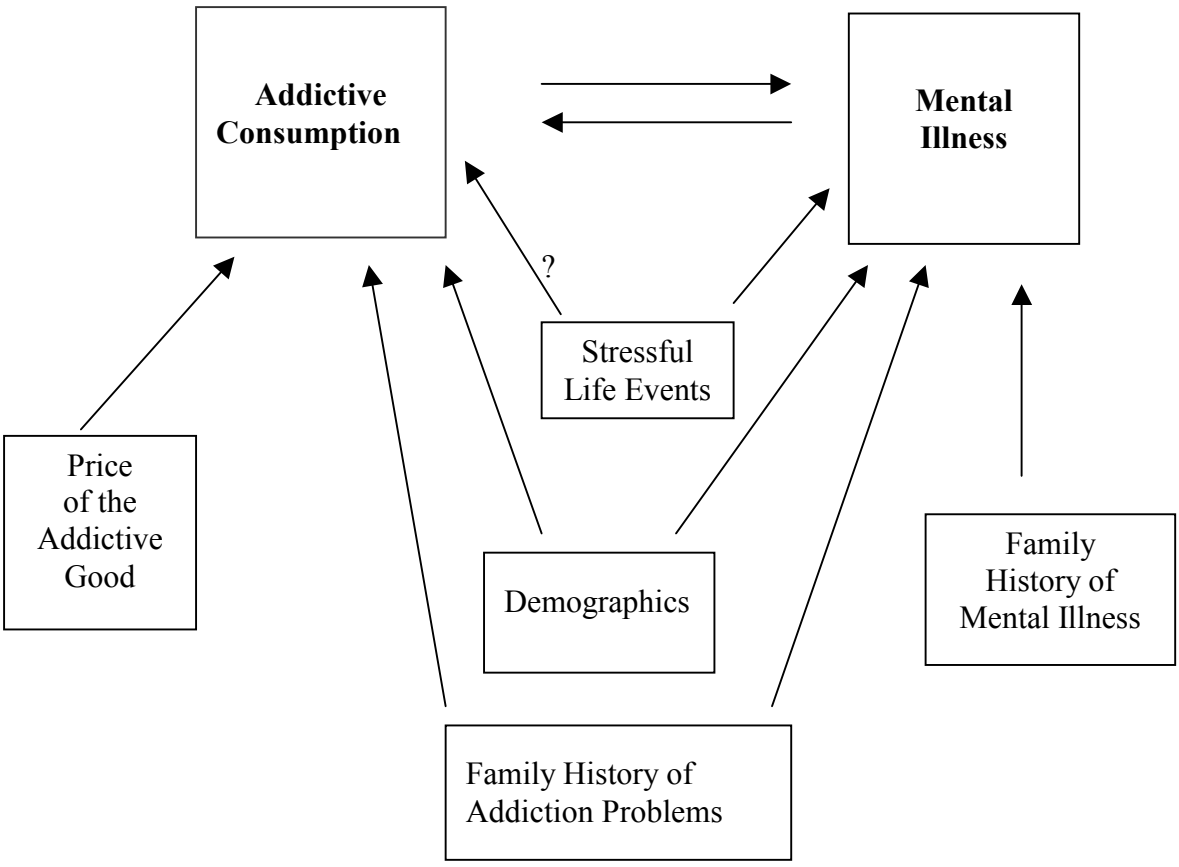

Table 1
Definitions and Weighted Means of Variables

Variable	Definition	Means Full Sample	Lifetime Mental Illness = 1	Lifetime Mental Illness = 0	Past Year Mental Illness = 1	Past Year Mental Illness = 0
Lifetime Mental Illness	A dichotomous indicator equal to one if the respondent is diagnosed with any of the 12 psychiatric disorders listed in the appendix, in their lifetime.	0.430	_	_	1.000	0.249
Past Year Mental Illness	A dichotomous indicator equal to one if the respondent is diagnosed with any of the 12 psychiatric disorders listed in the appendix, in the past 12 months.	0.241	0.561	0.000	_	_
Alcohol Participation	A dichotomous indicator equal to one for alcohol use in the past year.	0.637	0.672	0.610	0.637	0.637
Cocaine Participation	A dichotomous indicator equal to one for cocaine use in the past year.	0.021	0.034	0.012	0.031	0.018
Cigarette Participation	A dichotomous indicator equal to one for cigarette use in the past year.	0.307	0.397	0.242	0.422	0.271
Alcohol Price	Price of 750ml bottle of scotch, measured in dollars.	16.104	16.085	16.119	16.160	16.087
Cocaine Price	Price of one pure gram of cocaine, measured in dollars.	137.784	137.473	138.020	138.352	137.603
Cigarette Price	Average price per pack of cigarettes, including generic brands, measured in cents.	162.581	162.697	162.493	162.866	162.490
Income	Personal income of the respondent, measured in thousands of dollars.	19.637	16.964	21.652	13.521	21.579
Age	Age of the respondent.	33.068	32.873	33.214	31.647	33.519
Age Square	Square of age.	1208.046	1194.518	1218.243	1116.052	1237.250
Education	Number of years of formal schooling completed by the respondent.	12.864	12.612	13.054	12.343	13.029
Female	A dichotomous indicator equal to one if the respondent is female.	0.504	0.549	0.471	0.654	0.457
Married	A dichotomous indicator equal to one if the respondent is married.	0.606	0.587	0.620	0.551	0.623
Black	A dichotomous indicator equal to one if the respondent is black.	0.110	0.087	0.128	0.099	0.114
Religious Preference	A dichotomous indicator equal to one if the respondent has preference for any religion.	0.909	0.895	0.920	0.903	0.912
Mom Drink	A dichotomous indicator equal to one if the respondent reported that their natural mother had a problem with drinking.	0.070	0.099	0.048	0.103	0.059
Mom Drugs	A dichotomous indicator equal to one if the respondent reported their natural mother abused prescription drugs or had a problem with illegal drugs.	0.044	0.066	0.027	0.068	0.036
Mom Depressed	A dichotomous indicator equal to one if the respondent reported their natural mother being depressed for at least two weeks.	0.324	0.450	0.230	0.504	0.267
Ever Raped	A dichotomous indicator equal to one if the respondent was raped.	0.043	0.080	0.015	0.110	0.022
Ever Molested	A dichotomous indicator equal to one if the respondent was sexually molested.	0.070	0.119	0.034	0.145	0.047
Shock	A dichotomous indicator equal to one if the respondent suffered a great shock because someone close to them experienced one of these traumatic events.	0.119	0.163	0.086	0.192	0.096
Separation	A dichotomous indicator equal to one if the respondent had a long separation from a loved one in the past 12 months.	0.129	0.186	0.087	0.237	0.095
Sue Other	A dichotomous indicator equal to one if the respondent sued someone in the past 12 months.	0.029	0.040	0.021	0.049	0.022
Sued	A dichotomous indicator equal to one if the respondent was sued by someone in the past 12 months.	0.021	0.030	0.014	0.034	0.016
Conflict	A dichotomous indicator equal to one if the respondent had serious, ongoing tensions or conflicts with a relative, friend, neighbor, landlord/tenant, or someone at work or at school in the past 12 months.	0.243	0.361	0.155	0.423	0.186
Death of Relative	A dichotomous indicator equal to one if any close friend or close relative of the respondent died in the past 12 months.	0.216	0.229	0.206	0.267	0.200
Other Event	A dichotomous indicator equal to one if the respondent suffered any other major stressful event in the past 12 months.	0.115	0.150	0.089	0.173	0.097
Poor Health	A dichotomous indicator equal to one if the respondent rated their physical health as being poor.	0.016	0.028	0.008	0.042	0.008

Table 2
Full Sample Models

Dependent Variable	Alcohol Participation [1]		Cocaine Participation [2]		Cigarette Participation [1]	
Lifetime Mental Illness	0.15669 (2.81)	_	0.01457 (2.52)	_	0.28835 (5.51)	_
Past Year Mental Illness	_	0.12907 (2.40)	_	0.00572 (1.53)	_	0.26336 (5.11)
Alcohol Price	-0.01712 (-2.89)	-0.01781 (-3.17)	_	_	_	_
Cocaine Price	_	_	-0.00010 (-3.41)	-0.00010 (-3.17)	_	_
Cigarette Price	_	_	_	_	-0.00132 (-3.41)	-0.00138 (-3.33)
Income	0.00256 (7.09)	0.00252 (6.78)	-0.00007 (-0.65)	-0.00008 (-0.74)	-0.00050 (-0.90)	-0.00052 (-0.93)
Age	0.04574 (7.94)	0.04991 (8.90)	0.00919 (5.78)	0.01006 (6.43)	0.04503 (8.59)	0.05158 (9.87)
Age Square	-0.00069 (-8.75)	-0.00074 (-9.48)	-0.00015 (-5.95)	-0.00016 (-6.45)	-0.00058 (-8.24)	-0.00066 (-9.57)
Education	0.02094 (4.92)	0.02023 (4.54)	-0.00083 (-1.09)	-0.00111 (-1.41)	-0.04795 (-9.61)	-0.04829 (-9.31)
Female	-0.11601 (-6.93)	-0.12390 (-6.43)	-0.01900 (-6.12)	-0.01970 (-5.99)	-0.04623 (-2.58)	-0.06188 (-3.25)
Married	0.00838 (0.52)	0.00503 (0.32)	-0.01711 (-3.21)	-0.01805 (-3.36)	-0.03096 (-1.80)	-0.03521 (-1.98)
Black	-0.08920 (-4.58)	-0.09839 (-5.32)	0.00592 (1.04)	0.00479 (0.85)	-0.04605 (-1.20)	-0.06468 (-1.71)
Religious Preference	-0.04098 (-2.04)	-0.04831 (-2.39)	-0.01418 (-3.77)	-0.01551 (-4.00)	-0.07061 (-2.16)	-0.08690 (-2.56)
Mom Drink	0.03215 (1.67)	0.04392 (2.36)	_	_	_	_
Mom Drugs	_	_	0.02091 (3.18)	0.02401 (3.57)	_	_
Constant	-0.04448 (-0.30)	-0.04057 (-0.28)	_	_	0.35954 (3.54)	0.35804 (3.52)
Price Elasticity	-0.433	-0.450	-0.656	-0.656	-0.699	-0.731
F-test on Instruments	40.28**	49.81**	-	-	45.85**	52.67**
Overidentification Test	13.74	16.94	-	-	17.00	18.35*
Number of Observations	5,283	5,283	5,430	5,430	2,896	2,896

1 Models are estimated via two stage least squares. Calculated standard errors (not shown) are robust clustered by state. Asymptotic t-values are in parentheses. * Significant at 5 percent level. ** Significant at 1 percent level.

2 Models are estimated via single equation probit. Marginal effects are reported. Calculated standard errors (not shown) are robust clustered by state. Asymptotic z-values are in parentheses.

Table 3
Alcohol Participation

Dependent Variable	Alcohol Participation [1]		Lifetime Mental Illness [2]	Alcohol Participation [1]		Past Year Mental Illness [2]
Sample	Lifetime Mental Illness = 1	Lifetime Mental Illness = 0	Full	Past Year Mental Illness = 1	Past Year Mental Illness = 0	Full
Alcohol Price	-0.02097 (-3.97)	-0.01437 (-1.53)	-0.00182 (-0.39)	-0.02664 (-4.05)	-0.01494 (-1.71)	0.00316 (0.60)
Income	0.00295 (6.14)	0.00349 (3.85)	-0.00135 (-3.13)	0.00397 (5.09)	0.00291 (4.44)	-0.00130 (-2.76)
Age	0.03017 (4.08)	0.06158 (4.22)	0.04827 (13.84)	0.03626 (3.72)	0.05452 (6.74)	0.02248 (4.43)
Age Square	-0.00047 (-4.51)	-0.00091 (-4.58)	-0.00060 (-12.18)	-0.00055 (-4.01)	-0.00080 (-7.37)	-0.00029 (-4.06)
Education	0.01033 (1.92)	0.03400 (5.77)	-0.02422 (-8.30)	0.01199 (1.61)	0.02394 (5.16)	-0.02071 (-6.25)
Female	-0.08895 (-4.73)	-0.16195 (-6.39)	0.00597 (0.33)	-0.05985 (-2.27)	-0.16340 (-7.41)	0.09256 (4.24)
Married	0.00836 (0.54)	0.00175 (0.05)	-0.05554 (-3.47)	0.00888 (0.36)	0.00167 (0.08)	-0.03533 (-2.77)
Black	-0.06320 (-3.34)	-0.12367 (-3.20)	-0.07650 (-3.09)	-0.06791 (-2.29)	-0.11540 (-4.89)	-0.01345 (-0.57)
Religious Preference	-0.05406 (-2.21)	-0.02288 (-0.53)	-0.05422 (-2.75)	-0.08508 (-2.61)	-0.03006 (-1.03)	-0.00938 (-0.47)
Mom Drink	0.03259 (1.25)	0.06946 (1.74)	0.08924 (3.17)	0.05678 (1.97)	0.04218 (1.34)	0.01196 (0.52)
Mom Depressed	_	_	0.13530 (11.22)	_	_	0.12278 (10.65)
Ever Raped	_	_	0.25886 (8.97)	_	_	0.16167 (7.09)
Ever Molested	_	_	0.12933 (4.37)	_	_	0.07183 (3.06)
Shock	_	_	0.09839 (3.61)	_	_	0.07393 (2.95)
Separation	_	_	0.10351 (5.05)	_	_	0.11171 (6.03)
Sue Other	_	_	-0.02930 (-0.68)	_	_	0.07761 (2.59)
Sued	_	_	0.09654 (2.23)	_	_	0.06326 (1.20)
Conflict	_	_	0.14587 (10.71)	_	_	0.12756 (9.45)
Death of Relative	_	_	0.01434 (1.01)	_	_	0.04117 (4.16)
Other Event	_	_	0.05697 (2.48)	_	_	0.05909 (3.02)
Poor Health	_	_	0.08440 (1.44)	_	_	0.22008 (4.58)
Rho [3]	-0.1983 (1.92)	-0.1973 (1.92)	_	-0.1674 (1.53)	-0.1768 (3.01)*	_
Price Elasticity	-0.502	-0.380	-	-0.676	-0.377	-
Test of Price Differences [4]	4.23**		-	5.95**		-
Test of Difference in all Coefficients [4]	64.90***		_	43.57***		_
Number of Observations	2,984	2,299	5,283	1,712	3,571	5,283

1 Sample selection models are estimated as probit via Heckman's two-step procedure. Marginal effects are reported. Calculated standard errors (not shown) are robust clustered by state. Asymptotic z-values are in parentheses.

2 Probit selection equation. Marginal effects are reported. Calculated standard errors (not shown) are robust clustered by state.

3 Chi-square values for the Wald test of rho=0 are reported in parentheses. * Significant at 10 percent level. ** Significant at 5 percent level *** Significant at 1 percent level.

4 Likelihood ratio test. * Significant at 10 percent level. ** Significant at 5 percent level *** Significant at 1 percent level.

Table 4
Cocaine Participation

Dependent Variable	Cocaine Participation [1]		Lifetime Mental Illness [2]	Cocaine Participation [1]		Past Year Mental Illness [2]
Sample	Lifetime Mental Illness = 1	Lifetime Mental Illness = 0	Full	Past Year Mental Illness = 1	Past Year Mental Illness = 0	Full
Cocaine Price	-0.00005 (-0.92)	-0.00007 (-3.54)	0.00012 (0.87)	-0.00009 (-1.99)	-0.00007 (-2.29)	0.00022 (1.31)
Income	-0.00014 (-0.91)	-0.000004 (-0.07)	-0.00119 (-2.93)	-0.00019 (-1.06)	-0.00004 (-0.34)	-0.00124 (-2.51)
Age	0.00904 (5.30)	0.00251 (2.44)	0.04798 (13.61)	0.01001 (3.36)	0.00682 (4.86)	0.02241 (4.39)
Age Square	-0.00015 (-5.45)	-0.00004 (-2.47)	-0.00059 (-11.81)	-0.00015 (-3.29)	-0.00011 (-4.78)	-0.00029 (-3.99)
Education	-0.00138 (-1.30)	-0.000003 (-0.01)	-0.02468 (-8.59)	-0.00077 (-0.47)	-0.00106 (-1.58)	-0.02049 (-6.33)
Female	-0.01950 (-5.22)	-0.00490 (-2.62)	0.00914 (0.50)	-0.01775 (-2.92)	-0.01744 (-3.79)	0.09767 (4.37)
Married	-0.01539 (-2.88)	-0.00502 (-2.21)	-0.05535 (-3.34)	-0.02505 (-3.79)	-0.00695 (-1.45)	-0.03997 (-3.16)
Black	0.00456 (0.72)	0.00119 (0.34)	-0.07545 (-3.12)	0.01022 (1.19)	-0.00077 (-0.18)	-0.01745 (-0.74)
Religious Preference	-0.01185 (-3.12)	-0.00226 (-0.98)	-0.05777 (-2.83)	-0.01387 (-2.54)	-0.00644 (-1.79)	-0.00749 (-0.36)
Mom Drugs	0.01702 (2.70)	0.00404 (1.24)	0.07515 (1.85)	0.02914 (3.42)	-0.00061 (-0.09)	0.00219 (0.06)
Mom Depressed	_	_	0.13409 (11.88)	_	_	0.12150 (12.41)
Ever Raped	_	_	0.25439 (8.66)	_	_	0.16146 (7.41)
Ever Molested	_	_	0.13693 (4.66)	_	_	0.07728 (2.82)
Shock	_	_	0.09369 (3.41)	_	_	0.07349 (2.87)
Separation	_	_	0.10647 (4.90)	_	_	0.11379 (5.81)
Sue Other	_	_	-0.03102 (-0.73)	_	_	0.06514 (2.20)
Sued	_	_	0.09568 (2.17)	_	_	0.06421 (1.28)
Conflict	_	_	0.14649 (10.62)	_	_	0.12442 (9.41)
Death of Relative	_	_	0.01676 (1.14)	_	_	0.04193 (3.83)
Other Event	_	_	0.06037 (2.69)	_	_	0.05801 (3.10)
Poor Health	_	_	0.10383 (1.69)	_	_	0.23473 (4.51)
Rho [3]	0.3365 (0.67)	-0.5766 (6.48)**	_	0.0715 (0.10)	-0.2949 (1.12)	_
Price Elasticity	-0.182	-0.782	-	-0.402	-0.527	-
Test of Price Differences [4]	14.83***		-	5.28**		-
Test of Difference in all Coefficients [4]	62.93***		_	48.86***		_
Number of Observations	2,929	2,283	5,212	1,679	3,533	5,212

1 Sample selection models are estimated as probit via Heckman's two-step procedure. Marginal effects are reported. Calculated standard errors (not shown) are robust clustered by state. Asymptotic z-values are in parentheses.

2 Probit selection equation. Marginal effects are reported. Calculated standard errors (not shown) are robust clustered by state.

3 Chi-square values for the Wald test of rho=0 are reported in parentheses. * Significant at 10 percent level. ** Significant at 5 percent level *** Significant at 1 percent level.

4 Likelihood ratio test. * Significant at 10 percent level. ** Significant at 5 percent level *** Significant at 1 percent level.

Table 5
Cigarette Participation

Dependent Variable	Cigarette Participation [1]		Lifetime Mental Illness [2]	Cigarette Participation [1]		Past Year Mental Illness [2]
Sample	Lifetime Mental Illness = 1	Lifetime Mental Illness = 0	Full	Past Year Mental Illness = 1	Past Year Mental Illness = 0	Full
Cigarette Price	-0.00157 (-3.20)	-0.00068 (-1.63)	0.00014 (0.29)	-0.00138 (-2.31)	-0.00120 (-2.25)	0.00053 (0.99)
Income	-0.00092 (-0.83)	-0.00003 (-0.05)	-0.00141 (-2.29)	-0.00132 (-1.00)	-0.00012 (-0.23)	-0.00138 (-2.24)
Age	0.05370 (5.80)	0.02444 (4.18)	0.04782 (9.20)	0.05476 (5.02)	0.04480 (7.81)	0.02512 (3.80)
Age Square	-0.00073 (-5.83)	-0.00029 (-3.84)	-0.00059 (-7.81)	-0.00074 (-5.06)	-0.00056 (-7.32)	-0.00033 (-3.47)
Education	-0.05889 (-7.73)	-0.02755 (-6.63)	-0.02312 (-5.28)	-0.05330 (-5.72)	-0.04206 (-8.23)	-0.02132 (-4.70)
Female	-0.04628 (-1.36)	-0.03120 (-1.77)	0.01608 (0.85)	-0.11430 (-3.02)	-0.03658 (-2.04)	0.09446 (4.08)
Married	-0.02908 (-1.09)	-0.03084 (-1.40)	-0.05714 (-3.09)	-0.00272 (-0.07)	-0.04558 (-2.64)	-0.03946 (-2.11)
Black	-0.09813 (-2.27)	-0.00468 (-0.11)	-0.11546 (-3.92)	-0.12811 (-2.65)	-0.03699 (-0.90)	-0.04510 (-1.56)
Religious Preference	-0.07379 (-1.70)	-0.05072 (-1.55)	-0.03754 (-1.17)	-0.10676 (-1.69)	-0.07268 (-2.33)	0.02679 (0.99)
Mom Depressed	_	_	0.14472 (7.22)	_	_	0.12296 (9.50)
Ever Raped	_	_	0.25257 (4.94)	_	_	0.13878 (3.45)
Ever Molested	_	_	0.16231 (4.54)	_	_	0.11381 (3.77)
Shock	_	_	0.09366 (2.67)	_	_	0.10609 (3.31)
Separation	_	_	0.09199 (3.38)	_	_	0.10352 (3.43)
Sue Other	_	_	-0.03314 (-0.59)	_	_	0.04031 (0.94)
Sued	_	_	0.12522 (2.60)	_	_	0.11526 (1.98)
Conflict	_	_	0.14829 (7.20)	_	_	0.13892 (6.43)
Death of Relative	_	_	0.02547 (1.42)	_	_	0.05221 (3.22)
Other Event	_	_	0.06151 (1.99)	_	_	0.05791 (2.09)
Poor Health	_	_	0.07054 (0.72)	_	_	0.25534 (3.90)
Rho [3]	-.2730 (4.50)**	-.4878 (9.98)***	_	-0.2483 (5.24)**	-0.4693 (12.02)***	_
Price Elasticity	-0.643	-0.457	-	-0.533	-0.720	-
Test of Price Differences [4]	343.33***		-	26.49***		-
Test of Difference in all Coefficients [4]	380.64***		_	62.89***		_
Number of Observations	1,645	1,251	2,896	949	1,947	2,896

1 Sample selection models are estimated as probit via Heckman's two-step procedure. Marginal effects are reported. Calculated standard errors (not shown) are robust clustered by state. Asymptotic z-values are in parentheses.

2 Probit selection equation. Marginal effects are reported. Calculated standard errors (not shown) are robust clustered by state.

3 Chi-square values for the Wald test of rho=0 are reported in parentheses. * Significant at 10 percent level. ** Significant at 5 percent level *** Significant at 1 percent level.

4 Likelihood ratio test. * Significant at 10 percent level. ** Significant at 5 percent level *** Significant at 1 percent level.

Appendix 1

Derivation of the Demand Function

The individual maximizes the following utility function subject to an income constraint:

$$Max: U(A, X, M)$$
$$ST: PA + X = I.$$

To derive the demand curve, let the utility function be quadratic in A.

$$U_t = \alpha_1 A - \frac{1}{2}\alpha_2 A^2 - \alpha_3 M + \alpha_4 X.$$

A is consumption of the addictive good, with corresponding price P, X is consumption of the non-addictive good, with price normalized to one, I is current income, and M represents mental illness. In addition, the following restrictions are imposed on the parameters:

$$U_a = \frac{\partial U}{\partial A} = \alpha_1 - \alpha_2 A > 0$$
$$U_{aa} = \frac{\partial^2 U}{\partial A^2} = -\alpha_2 < 0$$
$$U_m = \frac{\partial U}{\partial M} = -\alpha_3 < 0.$$

The first and second conditions indicate positive but diminishing marginal utility of addictive consumption. The third condition shows that mental illness reduces utility. Furthermore, the marginal utility of current consumption and the extent to which it diminishes may vary with mental illness. To allow for this possibility, let α_1 and α_2 depend on M:

$$\alpha_1 = \delta_1 + \delta_2 M$$
$$\alpha_2 = \theta_1 - \theta_2 M.$$

If δ_2 and θ_2 are positive parameters, then mental illness raises marginal utility and lowers the rate at which it diminishes. The first-order condition for maximization with respect to A is:[12]

$$\delta_1 + \delta_2 M - (\theta_1 - \theta_2 M)A = \lambda P.$$

[12] λ is the marginal utility of income.

Solving this condition for A yields the following current period demand for the addictive good,

$$A = \psi_1(M) - \psi_2(M)P$$

where,

$$\psi_1 = \frac{\delta_1 + \delta_2 M}{\theta_1 - \theta_2 M} > 0$$
$$\psi_2 = \frac{\lambda}{\theta_1 - \theta_2 M} > 0.$$

Holding all else constant, ψ_1 represents the effect of mental illness on consumption. Mental illness has a positive effect on consumption if current marginal utility is higher or if marginal utility diminishes less for mentally ill individuals.

The effect of mental illness on the price responsiveness of consumption is given by the following derivative:

$$\frac{\partial^2 A}{\partial P \partial M} = -\frac{\partial \psi_2}{\partial M}.$$

If mental illness reduces the rate at which marginal utility diminishes such that θ_2 is positive, then the price effect, given by negative ψ_2, rises in absolute value. In this case, mentally ill individuals will be more responsive to price. If, on the other hand, the extent of diminishing marginal utility is greater for the mentally ill, then the price effect is smaller in absolute value and this group will be less price responsive.[13]

[13] The above analysis applies to a continuous measure of consumption. Since the dependent variable used in this study is dichotomous for participation, it is not appropriate to analyze the effects with differential calculus. The reservation price π, defined by evaluating the marginal utility of A at A=0, equals $\delta_1 + \delta_2 M$. Optimal consumption is zero if $\pi < \lambda P$ or if $\pi^* < P$, where $\pi^* = \pi/\lambda$ is the reservation price expressed in dollars. If mentally ill individuals have a higher marginal utility, they will have a higher reservation price. They will therefore be more likely to participate. Furthermore, if the mentally ill individual is initially not participating because $\pi^* < P$, then the decline in P required to shift the status from non-participation to participation is smaller than if the individual were not mentally ill and had a lower reservation price. Thus, mental illness also tends to increase the participation response with respect to actual price.

Appendix 2
Psychiatric Disorders from the National Comorbidity Survey

The following disorders are defined as dichotomous in the NCS data set. The mental illness variable used in this study was defined as equal to one if any of these disorders were present:

1) Generalized anxiety disorder is defined by a protracted period of anxiety and worry, accompanied by multiple associated symptoms. These symptoms include muscle tension, easily fatigued, poor concentration, insomnia and irritability.

2) Social Phobia describes people with marked and persistent anxiety in social situations, including performances and public speaking. The critical element of the fearfulness is the possibility of embarrassment or ridicule.

3) Simple Phobia include common conditions which are characterized by marked fear of specific objects or situations. Exposure to either the object of the phobia, either in real life or via imagination or video, invariably elicits intense anxiety, which may include a panic attack

4) Panic Attack is a discrete period of intense fear or discomfort that is associated with numerous somatic and cognitive symptoms. These symptoms include palpitations, sweating, trembling, shortness of breath, sensations of choking or smothering, chest pains, nausea or gastrointestinal distress, dizziness or lightheadedness, tingling sensations and chills or blushing and hot flashes. The experience generally provokes a strong urge to flee or escape from the place where the attack began.

5) Panic Disorder is diagnosed when a person has experienced at least two unexpected panic attacks and develops persistent concern or worry about having further attacks or changes his or her behavior to avoid or minimize such attacks.

6) Agoraphobia comes from the ancient Greek meaning a fear of an open marketplace. Agoraphobia today describes severe and pervasive anxiety about being in situations from which escape might be difficult or avoidance of situations such as being alone outside of home, traveling in a car, bus or airplane, or being in a crowded area.

7) Post traumatic stress disorder refers to the anxiety and behavioral disturbances and functional impairment which develop after exposure to an extreme trauma, such as rape, other severe physical assault, near death experience, witness to murder and combat, and which persist for more than a month.

8) Major depression features one or more major depressive episodes each of which lasts at least two weeks. The symptoms of major depression include expressed mood and loss of interest or pleasure. Other symptoms vary but might include sleep disorders, unusual weight changes, psychomotor changes, fatigue, feelings of worthlessness, diminished ability to concentrate and thoughts of death.

9) Dysthymia is a chronic form of depression. Its early onset and unrelenting, smoldering course are among the features that distinguish it from major depressive disorder. It is sometimes associated with passive, avoident and dependent traits. There are less symptoms required than there are for major depressive disorder, but the duration is at least two years.

10) Bipolar disorder is a recurrent mood disorder featuring one or more episodes of mania or mixed episodes of mania and depression. Bipolar is different from major depressive by virtue of a history of manic episodes. It has a higher familial prevalence than major depressive disorder.

11) Mania is a mood disturbance which ranges from euphoria to irritability. It may include inflated self-esteem, decreased need for sleep, being more talkative, racing thought process, distractibility, increased goal directed behavior and increased activities which are risky.

12) Non-Affective Psychosis is a summary category made up of schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder and atypical psychosis. It is characterized by profound disruption in cognition and emotion affecting the most fundamental human attributes such as language and thought. It can include hallucinations and delusions.