

THE DEMAND FOR SUBSTANCE ABUSE TREATMENT SERVICES  
IN MONTANA AND RURAL COLORADO

by

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A thesis submitted in partial fulfillment  
of the requirements for the degree

of

Master of Science

in

Applied Economics

MONTANA STATE UNIVERSITY  
Bozeman, Montana

September 2000

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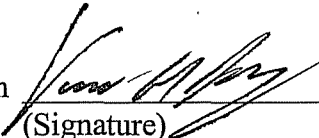
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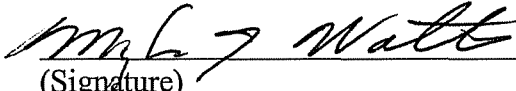
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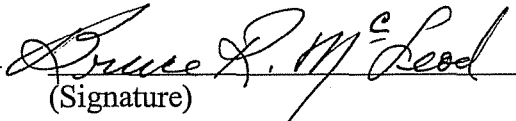
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For my sister

Cynthia Josephine Twichell  
(1954-2000)

## ACKNOWLEDGMENTS

I would like to express my sincere gratitude and respect for those who have shared their experience, strength, and hope with me throughout the development and preparation of this thesis. Vince Smith and George Haynes for their vision, patience, and guidance, Dave Buschena who listened and explained so simply, John Marsh who shared his spirit with me when I didn't think my spirit could stand one more day, Doug Young for his helpful suggestions with the preliminary research, and Donna Kelly for her supreme expertise in preparing the final document. I would also like to thank the Department of Agriculture Economics and Economics for expecting the best from me even when I was not sure I had it to give.

Heartfelt appreciation is offered to my parents for their ongoing love and support throughout my academic career. Equally heartfelt appreciation is extended to Jeff Brown and Wanda Zabel who each believed in my ability and helped me to have a sense of humor during this journey. A final thank you is expressed to my sister Cyndi Twichell. She loved me enough to tell the truth even when it hurt, and whose death revealed a strength in me that was previously unknown.

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## ABSTRACT

Treatment seeking behavior by individuals diagnosed as substance abusers is examined. A benefit/cost framework is utilized to analyze the decision to seek substance abuse treatment services. It is argued that treatment services are sought when the present value of the expected future stream of benefits from treatment are greater than the present value of its expected future costs. It is also argued that events that either raise the expected benefits or lower the expected costs of seeking treatment increase the probability that these services will be sought.

The data for this study were selected from a telephone survey of non-institutionalized adults residing in the state of Montana and the rural communities of Colorado. Multinomial logistic (logit) regression models were used to estimate the willingness to seek substance abuse treatment services as a function of twelve economic and socio-demographic variables and four external pressure variables. Results are presented for the total adult sample and five pairs of population subgroups: low and high-income individuals, men and women, low-income men and women, high-income men and women, and the employed and unemployed.

The reported findings on the external pressure to individuals about their substance use, employment status, income levels, educational status, marital and primary child care responsibilities, and gender issues confirm that these variables have a significant influence on the substance user's decision to seek treatment services for the total population and subgroups studied. Although Likelihood Ratio tests did not reject the hypotheses that the treatment seeking decision is identical for each pair of subgroups analyzed, the results obtained nevertheless provide new and interesting insights into the decision to seek substance abuse treatment services.

## CHAPTER 1

### INTRODUCTION

Alcohol and drug abuse permeate communities throughout the developed world. In the United States, more than 13 percent of the adult population is estimated to abuse alcohol and over 2 percent to suffer from acute alcoholism. In addition, more than 2 percent of the adult population is estimated to abuse drugs (Riley, et al. (1997)). The economic and social costs of alcohol and drug abuse are commensurately large, exceeding an estimated \$200 billion dollars annually (National Institute of Health, 1998). Estimates of annual costs associated with health care expenditures and lost productivity exceed several billion dollars. Adverse effects on spouses, children and other family members, family relationships, crime rates and other social indicators are also widely recognized as substantial. The potential benefits from reducing alcohol and drug abuse and dependency are therefore large. One important public policy mechanism for achieving this goal is through prevention programs (most often targeted at children). Another is through treatment of current substance abusers (most often for adults). A particular concern for policy makers at the state level in the U.S. is the demand for treatment among low-income populations for whom the states have fiscal responsibilities under Medicaid programs.

The objective of this thesis is to assess the possible effects of several economic and socio-demographic variables and four individual external pressure variables on the decision to seek substance abuse treatment services. Treatment services, according to the American Society of Addiction Medicine's (ASAM) criterion, are broadly defined to include treatment from paid professionals, voluntary support groups like Alcoholics Anonymous, and unpaid counselors such as clergy members.

Gary Becker has argued that:

When an apparently profitable opportunity to a household is not exploited...it postulates the existence of costs, monetary or psychic, of taking advantage of these opportunities that eliminate their profitability...(Becker, 1987).

Given this argument, a benefit/cost framework is utilized to analyze the decision of seeking substance abuse treatment services in terms of the perceptions of the benefits and costs. It is argued that treatment services will be sought when the present value of the expected future stream of benefits from treatment are greater than the present value of its expected future costs. It is also argued that events that either raise the expected benefits or lower the expected costs of seeking treatment increase the probability that these services will be sought. It is these events and their influence on the decision to seek treatment services that are of primary interest in this thesis.

The study utilizes data obtained from a 1996 telephone survey of alcohol and drug use by a sample of 13,804 adults in the state of Montana and rural communities of Colorado. The sample is representative of the non-institutionalized Montana and Colorado adult population between the ages of 18 and 65.

The thesis proceeds as follows. Chapter 2 surveys the current theoretical and empirical economic literature regarding substance abuse and treatment seeking behavior along with the other social science literature that seeks to explain the behavior of addicted persons. A discussion of three theoretical models and the applicable empirical evidence regarding each model is offered, the relevant time preference literature is briefly examined, followed by a review of the current social science literature investigating the decision to seek treatment.

Chapter 3 presents a simple cost/benefit economic model of the individual's decision to seek substance abuse treatment services. Factors affecting the perceived costs and benefits of treatment seeking are also discussed. Chapter 4 describes the population considered in this study, the survey methods, the survey instrument and its limitations, and the characteristics of the data set utilized in the study.

Chapter 5 presents the estimation models and discusses estimation methods, properties of the estimators and error terms, and the employment of the Likelihood Ratio test in the context of testing for structural differences between sample subgroups. A weighting strategy for the data is briefly discussed. Chapter 6 presents results obtained by employing the empirical models and estimation methods of Chapter 5, and Chapter 7 discusses policy implications for the results of the study along with further research topics suggested by these results.

## CHAPTER 2

### LITERATURE REVIEW

The topics of Substance Abuse and treatment seeking behavior have been investigated by economists and other social scientists. The purpose of this chapter is to survey the current theoretical and empirical economic literature regarding these topics along with the other social science literature that seeks to explain the behavior of addicted persons. Included is a discussion of three theoretical models and the applicable empirical evidence regarding each model, followed by a brief examination of the relevant time preference literature, and a review of the current social science literature investigating the decision to seek treatment.

#### Theoretical Models of the Demand for Health and for Addiction

Although the decision to seek substance abuse treatment services has not been explicitly modeled by economists, theoretical and empirical research has examined the demand for health (Grossman (1972,1997)) and the behavior of the addicted individuals (Becker and Murphy (1988)). Since the decision to seek treatment may be thought of as a decision for health as a commodity (Grossman) or as forward looking behavior with respect to continued or discontinued use of addictive substances (Becker and Murphy) these models will be explored. The discipline of psychology has also developed models of addictive behavior,

including the Melioration model developed by Herrnstein and Vaughan (1980), in which the individual is assumed to choose the next available alternative that maximizes a total utility function with no regard for future consequences. Each of these models is discussed below along with the applicable empirical evidence.

### Grossman's Model of The Demand for Health

Grossman (1997, 1972) argues that the demand for medical care originates from the interaction of the demand function for health and the production function of health. He derives a model from the household production function models of Becker (1965) and Michael and Becker (1973) and on the human capital theory of Becker (1964, 1967), Ben-Porath (1967), and Mincer (1974). In household production models, individuals purchase market goods and services and then combine them with time, labor, and expertise within production functions analogous to firm production functions, in order to produce utility. Grossman argues that the efficiency of these production functions, as defined by the amount of output produced from a given amount of inputs, is affected by the efficiency or productivity of the individual.<sup>1</sup> The individual is then assumed to maximize utility subject to a market budget constraint, a time constraint, and a set of production functions. Grossman uses this framework to account for the demand for medical services as one of the inputs to the production of health.

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<sup>1</sup> According to Grossman this productivity is a function of a person's stock of knowledge commonly referred to as human capital and that years of formal schooling completed play a significant role in this context; persons with more schooling are assumed to have larger stocks of knowledge and are therefore more efficient producers of utility.

Drawing on human capital theory, Grossman identifies the household production of gross health investment as a stock variable. Partially inherited and depreciable over time, this variable enters the utility function directly by producing a healthier, longer life and indirectly by increasing the amount of healthy time that can be devoted to producing additional income and non-market commodities. In the context of Grossman's framework, an individual who seeks substance abuse treatment services chooses a level of health investment which increases utility directly, while also making a choice for an increase in healthy time that can be devoted to producing extra income and non-market commodities.

Support for Grossman's model, in whole or part, has been offered by a number of empirical studies (Nocera and Zweifel (1998), Erbsland et al, (1995), Kenkel (1994), Wagstaff (1993 and 1986), van Doorslaer (1987), Cropper (1981), and Grossman (1997,1972)). An important limitation to these studies has been the measurement of the health capital variable as it is largely unobservable and accurate proxies are difficult to obtain. This limitation contributes to problems in interpreting the size of the regression coefficients in estimated demand models of the demand for health. Two recent studies (Gerdtham and Johannesson (1999), Gerdtham et al. (1999)) have attempted to correct for this limitation by using a categorical measure for health status and two continuous measures of health status developed by Torrance (1986). After attempting to correct for the above limitation with respect to health states, these studies still find evidence that supports Grossman's Demand for Health model.

### The Rational Addiction Model

The Rational Addiction model (Becker and Murphy (1988)) assumes consumers to be rational in that they use all information available to them at a given point in time when making a decision. It also assumes that individuals are “forward-looking” in their behavior, implying that consumers consider how decisions made in the present will affect them in the future based on their expectations of the outcomes of their decisions. Becker and Murphy, building on models introduced by Stigler and Becker (1977), and extended further by Iannaccone (1986, 1984), argue that addicted individuals, with stable preference maps, rationally maximize total utility functions subject to given budget constraints as they attempt to anticipate the future consequences of their present choices. In this sense individuals are assumed to follow a consistent plan to maximize utility over time using all the information available to them at each decision point. According to Becker and Murphy this model relies on a weak concept of rationality which allows for individuals to have high rates of time preference with respect to future events, in which case they exhibit myopic behavior. When this is the case it becomes “rational” for the individual to ignore the consequences of current actions on outcomes that occur in the future. In the case of addiction, Becker and Murphy claim myopic consumers are more likely to become addicted since the future costs of current addictive substance consumption are heavily discounted along with any future benefits from abstention.

Becker and Murphy describe the individual’s attempt to end a harmful addiction by complete termination of addictive substance use as a “cold turkey” action. This behavior is consistent with their rational framework in that the individual is willing to trade a short-term

decrease in utility for a larger long-term gain in the future. Becker and Murphy also consider that in order for the addicted person to make the decision to stop using an addictive substance “cold turkey”, events must either sufficiently lower the demand for the addictive good or the stock of consumption capital. For our purposes this condition can be thought of as the perceived cost of continued substance use exceeding the perceived benefit of continued use at the time of the decision. Therefore, in this framework, an individual deciding to seek treatment for substance abuse would be forward-looking in an attempt to maximize a lifetime utility function. In this context, seeking substance abuse treatment services are perceived by the individual to increase their lifetime utility, presumably by increasing the benefits of long-term abstinence over the short-term costs of cessation and over the long-term benefits of continued use. To date no empirical studies have applied the Rational Addiction framework to the decision to seek substance abuse treatment services.

Evidence supporting the rational addiction model has been offered regarding cigarette smoking (Labeaga (1999), Becker, et al. (1994, 1991), Keeler, et al. (1993), Chaloupka (1991 and 1988)), alcohol consumption (Bentzen (1999), Grossman, et al. (1998)), Waters and Sloan (1995), Chaloupka, et al. (1993)), cocaine consumption (Grossman and Chaloupka (1998)), caffeine consumption (Olekalns and Bardsley (1996)), and gambling (Mobilia (1990)). Others have offered alternate forms of the Rational Addiction model (Goldbaum (2000), Fehr and Zych (1998), Orphanides and Zervos (1998, 1995)).

Some studies attempt to refute the model on theoretical grounds. Akerlof (1991) argues that individuals fail to fully recognize how their current actions affect future outcomes violating the Becker/Murphy concept of perfect foresight. Björn Frank (1996) uses an

internal game theory model indicating that a person may become addicted due to chance and not some underlying function of unstable steady states of addictive consumption, although he admits his model would be hard to test empirically. Cameron (2000) incorporates the psychopharmacological addictiveness of nicotine into his model to explain addiction, a variable he claims is ignored by Becker and Murphy. Employing ordinary least squares estimation, Cameron reports a negative relationship between nicotine content and smoking and argues this finding to be consistent with the models of self control (Ainslie (1986, 1982, 1975), Elster (1984), Thaler and Shefrin (1981), Schelling (1980), Winston (1980)) or cognitive dissonance (Festinger, 1957)<sup>2</sup> dismissed by Becker and Murphy. In spite of these attempts to refute the Becker/Murphy Rational Addiction model, as discussed above, a considerable body of literature supports the model ( Bentzen (1999), Labeaga (1999), Grossman and Chaloupka (1998), Grossman, et al. (1998), Orphanides and Zervos (1998, 1995), Olekalns and Bardsley (1996), Waters and Sloan (1995), Becker, et al. (1994, 1991), Chaloupka, et al. (1993), Keeler, et al. (1993), Chaloupka (1991 and 1988), Mobilia (1990)). However, it should be noted that the Becker/Murphy model does not attempt to explain behavior that involves treatment seeking and subsequent relapses into substance use.

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<sup>2</sup> Cognitive Dissonance theory argues a person will block out the personal risk of an action by representing false beliefs to themselves in order to mitigate the perceived risk of taking an action. Examples include smokers telling themselves that 'I am not really a heavy smoker', or 'My father smoked like a train and he live until he was 89', in order to alleviate personal concerns regarding their behavior.

### Melioration Model

Psychologists Herrnstein and Vaughan (1980) argue that individuals typically do not maximize the overall utility associated with a particular set of choices. They instead choose alternatives that provide the highest average satisfaction or value to them in the present time period without regard for how choices in the current time period affect choices in subsequent time periods, in other words, they are myopic in nature. A meliorating individual chooses those activities that provide the highest benefit to them at the time of the decision. Implicit in this argument is that individuals are able to assess only the current benefits associated with each alternative and weigh them against the current benefits of other alternatives to make a decision. Hence, each individual weighs the costs, in terms of the alternatives sacrificed, and benefits of alternative actions and chooses the option that provides the highest benefit in the current time period. In the context of the melioration framework, an individual who decides to seek treatment for a substance abuse problem would assess the options available to them, to continue substance use or seek treatment, and conclude the benefit of seeking treatment to be greater than the benefit of continued use.

No empirical studies have been offered applying the melioration framework to substance abuse treatment decisions for humans and because the Melioration model was developed within the discipline of psychology, the experimental evidence offered has centered on animal based laboratory studies. Experiments involving animals (reviewed in Heyman and Herrnstein (1986)) show animals to consistently meliorate and the few studies conducted on human behavior (Herrnstein, et al. (1993), Herrnstein and Prelec (1991), Herrnstein and Vaughan (1987), Herrnstein, et al. (1986)) report melioration behavior in humans that ignore

or are unclear of the affects of current behavior on future events. This suggests individuals may not have the low rates of time preference Grossman and Becker and Murphy have proposed in their models, but may have high rates of time preference that allow them to disregard the costs and benefits of future events.

### Time Preference

The rational and melioration models maintain a common thread of information, namely the rate of time preference for the individual. This rate of time preference refers to the level of utility an individual receives from consuming a commodity in the current time period as opposed to some future period. Persons with a high rate of time preference prefer present consumption over future consumption and are described as impatient or myopic since future consumption has little or no value to them.

Evidence provided by empirical research on the rate of time preference as applied to the addicted individual is mixed. Studies that support the Rational Addiction model discussed above also claim to refute the myopic tendency of individuals. However, Chaloupka (1990), using cigarette demand equations derived from the Becker/Murphy rational addiction framework, reports men behave more myopically than women. Ainsley (1992) and Skog (1997) argue the presence of dynamic preference rates and Orphanides and Zervos (1998) argue the rate of time preference is an increasing function of past consumption. Bretteville-Jensen (1999) reports that active injectors of heroine and amphetamine have higher rates of time preference than those who never used the substances. This raises the question of

whether high time preference rates of individuals lead to addiction or whether the advancing addiction itself alters time preference rates.

Ambiguities aside, the addict's time preference rate is assumed to be large in the Melioration model. The individual maximizes utility in the present time period by choosing the consumption set that provides the highest level of utility in the current period, disregarding any subsequent time periods. Hence, future consumption adds little or no value to the addict's lifetime utility. The Rational Addiction model assumes a rate of time preference close to the market discount rate so that the addict maximizes a total utility function rationally over many time periods. This implies that future consumption lends some value to the addict's total utility function. Becker and Murphy do not rule out a high rate of time preference for their model, in fact they argue those persons most likely to become addicted would be ones with a very high rate of time preference. Therefore, in the context of the Rational Addiction model, if a sufficiently high rate of time preference is assumed for the rational addiction model, the individual's behavior begins to look very similar to the behavior described by the Melioration model. Under these conditions the decision making process effectively collapses to a one period time model in which the individual compares the current marginal benefit of an action with its current marginal cost. It then becomes appropriate to investigate what factors may influence a person's perception of the benefits and costs of taking a particular action only in the current time period, an action such as seeking substance abuse treatment services.

The Decision to Seek Substance Abuse  
Treatment Services: Empirical Research

The factors that affect the substance abuser's perception of the benefits and costs of treatment, many demographic in nature, have not been investigated by economists in terms of their quantitative effects on the demand for treatment services.

Grossman (1972) discusses existing models for the demand for health outside of economic theory that have variables other than price and income level as explanatory variables. He argues that these "taste-matrix" variables, such as age, education, a person's state of health, and their general attitude toward medical care, render the models unsatisfactory since "economic analysis does not explain the formation of tastes and thus cannot predict the effects of shifts in taste variables on the demand for health." With this in mind, many economists have not focused research attention on taste-type variables. However, where such variables are indicators of, or proxies for, the potential benefits and costs of seeking treatment, there is rationale for their inclusion in empirical analyses.

Studies of the demand for substance abuse treatment have mainly been conducted in other disciplines such as Sociology, Psychology, Social Psychology, Behavioral Psychology, and Psychiatry, and focus mainly on the factors that affect the willingness to seek treatment services. A variety of population subgroups have been studied including those with dependencies on alcohol (Kaskatus, et al. (1997), Hasin (1994), Weisner (1990), and Beckman and Amaro (1986)), cocaine (Varney, et al. (1995) and Carroll and Rounsaville (1992)), opiates and other injected drugs (Zule (1997), Rounsaville, et al. (1985), and Kraft (1993)), and individuals with both alcohol and substance abuse dependencies (Yih-Ing, et al.

(1997)). Pregnant women (Messer, et al. (1996)) and male partners in marital relationships (Steinberg, et al. (1997)) have also been studied. It should be noted that there are limitations to some of these studies since they address particular treatment populations but provide no comparison with other populations. An example of this includes studies focusing on individuals who entered a treatment facility but not on populations who chose not enter a treatment facility. Therefore, the issue as to who does not enter treatment and why may not be adequately addressed. Exceptions to this limitation are studies by Bell, et al. (1998), Hasin (1994), and Carroll and Rounsaville (1992).

The variables considered in these studies include age, employment status, gender, marital status, race, travel and distance barriers, perceived severity of the substance abuse problem, previous treatment history, social consequences, and the internal and/or the external pressure the individual is experiencing regarding their substance use prior to treatment entry. The relevant studies regarding each variable are discussed below.

### Age

Evidence on the affects of age on the treatment seeking decision is mixed. Zule, et al. (1997), in a study of injection drug users, found age to not be a significant indicator of treatment seeking behavior. However Fortney, et al. (1995), examining a sample of 4,621 U.S. veterans completing an inpatient alcoholism treatment program in a VA hospital, reported a quadratic age relationship that predicted those patients who were 42 years old had the highest probability of keeping their treatment appointments. In contrast, Kaskutas, et al. (1997), employing longitudinal data from in-person interviews with substance users, found

that persons under the age of 30 were approximately five times more likely to seek help while those aged 30 to 39 were over twice as likely to have sought help than those over 40 years of age. Several studies (Herd (1986 and 1984), Weisner (1984), Furst, et al. (1981), Armor, et al.(1978), et al., Towle (1974)) reported African Americans in treatment to be 6 to 8 years younger than other clinical ethnic groups. Towle (1974) analyzed data from over 400 National Institute on Alcohol Abuse and Alcoholism (NIAAA) supported treatment projects and reported Native American treatment populations to be younger also.

### Employment Status

A study by Carroll and Rounsaville (1992) found that cocaine abusers who sought treatment were more likely to hold a full time job in a professional or skilled labor setting, suggesting they may have more to lose through continued substance use if their employment situation was in jeopardy. In contrast, Kleyn and Lake (1990) reported a negative relationship between employment and willingness of injection drug users to enter treatment. Zule, et al. (1997) also found that, of those injection drug users wanting treatment, less than 10% reported full-time employment while Stokes (1977), in a study of alcoholic women, reported unemployed individuals reached the alcohol treatment system earlier than those who were employed.<sup>3</sup>

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<sup>3</sup> These differences may be due to the type of drugs being consumed. For example, cocaine is a stimulant and individuals become more active, ambitious, etc. and may be more likely to be employed. On the other hand, alcohol and heroine are depressants so individuals become less motivated therefore employment may not be a priority.

### Gender

Evidence on the role of gender is mixed. Zule, et al. (1997), using bivariate analysis, reported that women are more likely than men to want treatment. However, Kaskutas, et al. (1997) reported men to be more likely to seek treatment during a longitudinal period from 1984 to 1992 which was consistent with the National Institute on Alcohol Abuse and Alcoholism's (1988) study of women and alcohol abuse that reported the proportion of woman receiving treatment was much smaller than men. Dahlgren and Myrhed (1977) found that men had a higher rate of self-referral into treatment services while women were more often coerced by family members to seek treatment. They also found women were more likely to delay treatment entry until acute illnesses were experienced.

### Marital Status

Carroll and Rounsaville (1992) and Fortney, et al. (1995) reported marital status to be a significant indicator of treatment seeking behavior. Steinberg et al. (1997), in a study of male alcoholics who were married or living in a marriage type of relationship, found that almost half the men participating in the study cited their partners as the primary source of motivation to seek treatment. In contrast, several studies found husbands to be effective in delaying treatment entry of wives (Robinson (1984), Badiet (1976), Beckman (1975), Lindbeck (1972)), and Stokes (1977) reported that unmarried women entered the alcohol treatment system before married women.

## Race

Evidence on the role of race is also ambiguous. Fortney et al. (1995) reported race to be negatively associated with the likelihood of aftercare treatment attendance among military veterans. Messer, et al. (1996), examining pregnant women's utilization of substance abuse treatment services, reported that African American women were more likely to accept an offer of treatment, and several studies found African Americans to be over represented in treatment populations (Herd (1984 and 1986), Weisner (1984), Furst (1981), Armor, et al.(1978), et al., Towle (1974)). Kaskutas, et al. (1997) reported Hispanic persons to be more likely to seek treatment for alcohol dependencies but Paine (1977) found Hispanics enter treatment only about half as frequently as the rest of the population. Towle (1974) reported Native Americans were over represented in treatment populations while Riley, et al. (1997) reported that, in the state of Montana, Native Americans were more than twice as likely to seek treatment as non Native Americans.

## Travel and Distance Barriers

Fortney, et al (1995) also reported that travel barriers, especially for the elderly and rural veterans, and the size of the residing community were negatively associated with the likelihood of aftercare attendance. Hoffman (1974) found distance to be negatively associated with treatment utilization for men but not women.<sup>4</sup>

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<sup>4</sup> Information regarding travel barriers was not available for this study therefore the relevance of travel barriers on the decision to seek treatment services will not be addressed.

### Perceived Severity of the Substance Abuse Problem

In accordance with the general consensus in the literature, recent studies have reported that the personal perception of the severity of the substance abuse problem was a motivating factor in treatment seeking behavior (Bell, et al. (1998), Hasin (1994), Hingson, et al. (1980)), while Fortney, et al. (1995) found the severity of illness to be negatively associated with attendance of aftercare appointments. Here aftercare may be considered another form of treatment separate from inpatient treatment therefore the decision to enter into aftercare treatment can be viewed as a separate decision to enter treatment. However, it should be noted that the decision to enter aftercare is not independent of the initial decision to enter treatment since the initial treatment experience influences the individual's decision to seek further treatment.<sup>5</sup>

### History of Treatment

Stokes (1977) found that first-time treatment seekers were more likely to delay treatment entry. Carroll and Rounsaville (1992) reported that treatment seekers were more likely to have previous involvement in formal treatment than non-treatment seekers. Further support for this finding is provided by Zule, et al. (1997) and Messer, et al. (1996). However, a study by Richman and Smart (1981) reported the probability of entering treatment decreased with each subsequent admission to a detoxification center.

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<sup>5</sup> The issue of perceived severity of the individual's substance abuse problem will not be addressed in the present study since the data utilized in this analysis provided no information on this issue.

### Social Consequences

A number of studies have reported that the social consequences of substance abuse are significant indicators of treatment seeking behavior when social consequences are defined as legal and/or health problems, loss of job and/or spouse and family, and social ostracism. Hingson, et al. (1982) reported that negative social and psychological consequences were the most important reasons cited for seeking treatment among a sample of Boston residents who reported having a drinking problem at some point in their lives. Rounsaville and Kleber (1985) reported that social, legal, and psychological problems provided incentive to seek treatment in opiate addicts, and Varney, et al. (1995) found the motivation to seek treatment in cocaine abusers to be primarily related to adverse consequences of use, not the extent of cocaine involvement that was originally hypothesized. Kaskutas, et al. (1997) also reported that among alcoholics, experiencing at least three social consequences from drinking behavior was a significant predictor of seeking help. Carroll and Rounsaville (1992) found cocaine addicts not seeking treatment experienced fewer negative consequences from their use suggesting that those who sought treatment were experiencing substantial pressure to seek treatment.<sup>6</sup>

### Internal and External Pressure to Seek Treatment

Several studies have examined the relative importance of pressures for treatment from external sources such as family, friends, employers, physicians, and clergy as compared to internal pressures from the individuals themselves to seek treatment. Steinberg, et al. (1997),

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<sup>6</sup> Information regarding social consequences was not available for this study therefore its relevance on the decision to seek treatment services will not be addressed.

examining the role of internal pressure as a motivator of treatment seeking, reported that 74% of men diagnosed with alcohol abuse or dependency according to Diagnostic and Statistical Manual of Mental Disorders, Volume III-R (DSM III-R) criteria, had experienced some form of internal pressure, such as guilt and/or concern about having a substance abuse problem, prior to seeking treatment. They concluded that such internal pressure is related to a positive treatment outcome when combined with external pressures such as threat of divorce or job loss, and legal and/or health problems, that is, a perceived increase in adverse social consequences from continued substance abuse. Motivation to seek treatment has been studied by others and has been found to be a significant indicator of treatment seeking behavior. George, et al. (1996), Hasin (1994), Carroll and Rounsaville (1992), Krampen (1989), Miller (1985), Hingson, et al. (1982), Dahlgren and Myrhed (1977), and Lemere, et al. (1958) all reported motivation to seek treatment was increased by pressure from outside sources such as family, friends, and employers. Other studies (Davis (1997), Beckman and Amaro (1986)) found pressure from some individuals, typically spouses, actually prevented or deterred treatment seeking behavior in women.

### Summary

The decision to seek treatment services can be modeled as a decision for a healthier life, as a forward-looking utility maximization problem, and as an increasingly myopic decision. When the substance abuser's time preference is assumed to be very high, the decision to seek treatment effectively collapses to a one-period time model in which the

individual compares the perceived costs of seeking treatment to the perceived benefit at the time the decision is made.

The factors that influence an individual to seek treatment at a given point in time have been studied by social scientists and current empirical research provides information on several variables such as age, employment status, gender, marital status, race, travel and distance barriers, perceived severity of substance abuse problem, history of treatment, social consequences, and internal and external pressures to seek treatment. The role of these variables are of considerable interest in the present study since variation in these variables has been shown to alter the willingness to seek treatment services. Of principle interest in the present study is how, in the context of the cost/benefit framework, these variables affect the perception an individual has regarding the costs and benefits of seeking substance abuse treatment services. The next chapter introduces a simple economic model of costs and benefits and discusses the role of pressure and other variables in the individual's perception of the costs and benefits of treatment.

## CHAPTER 3

### THE THEORETICAL FRAMEWORK

The purpose of this chapter is to present a simple cost/benefit economic model of the individual's decision to seek substance abuse treatment services. In the interest of brevity, substance abuse treatment services will be referred to as treatment or treatment services throughout the discussion.

#### The Model

In this model individuals are assumed to be forward-looking and to choose courses of action that they expect will maximize their welfare. In this context, within the limits of the resources available to them, rational people choose actions whose expected benefits outweigh their expected costs, where the opportunity costs of any given action are represented by the potential benefits from the next best alternative actions that have to be sacrificed. This general framework is used by Grossman, Becker and Murphy, and Herrnstein and Prelec in the models reviewed in the previous chapter.

In the context of the decision to seek treatment, this general principle can be represented by a cost/benefit framework where the decision to seek treatment services can be viewed as a choice over time or a dynamic decision. An individual will seek treatment

when the present value of the expected future stream of benefits from treatment is greater than the present value of its expected future stream of costs. Let  $B(x)$  denote the treatment benefits function and  $C(z)$  denote the treatment cost function for an individual, where  $x$  and  $z$  are vectors of variables affecting perceptions of costs and benefits. Let  $\phi$  represent the discount factor (where  $\phi = 1 + r$ , and  $r$  is the rate of time preference), and let  $E$  represent the expectations operator. When  $T$  is the most distant time period for which the individual accesses the benefits and costs of an action,<sup>7</sup> the mathematical representation of the decision rule at any moment in time ( $t = 0$ ) is then as follows:

If  $\int_0^T e^{-\phi t} E[B(x_t)] dt - \int_0^T e^{-\phi t} E[C(z_t)] dt \geq 0$ , then seek treatment;<sup>8</sup>

If  $\int_0^T e^{-\phi t} E[B(x_t)] dt - \int_0^T e^{-\phi t} E[C(z_t)] dt < 0$ , then do not seek treatment.

Thus, events that increase  $B$  or reduce  $C$  increase the probability that an individual will seek treatment and vice versa. The vectors  $x$  and  $z$ , contained within the benefit and cost functions respectively, include variables that may affect the individual's assessment of the benefits and costs of treatment.

In addition to events that increase benefits or decrease costs, events that change the individual's rate of time preference, and therefore alter  $\phi$ , may also affect the decision to seek treatment. From the substance abuser's perspective, often the benefits from treatment are perceived to accrue over the longer term while the costs of treatment in terms of monetary

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<sup>7</sup> Grossman and Becker and Murphy define  $T$  as the point of death.

<sup>8</sup> When the present value of a benefits stream is equal to its associated cost stream, it is not clear what action will be taken as the individual is genuinely indifferent between the alternative of choosing the action and not choosing it. For convenience of exposition, here it is assumed that if the benefit and cost streams have identical present values, treatment will be sought.

costs, time, and the physical and psychological costs of the withdrawal process have to be endured in the near term. In this setting, a decrease in the rate of time preference will increase the likelihood of seeking treatment by increasing the present value of future longer-term treatment benefits relative to more near term treatment cost. However, no information regarding time preferences is available within the data set utilized for this study and therefore the potential effects of changes in the rate of time preference on the decision to seek treatment are not addressed in this study.

#### Perceived Benefits and Costs of Treatment Seeking

In the context of the decision to seek treatment, the benefits and costs of seeking treatment need to be broadly defined and, in some cases, the affects of a given variable on those benefits and costs can be difficult to classify. For example, pressure by spouses and other family members to seek treatment could be viewed as increasing the perceived benefits of treatment by enabling the individual to meet the needs of others with whom close relationships exist. Such pressures could also be viewed as reducing the costs associated with treatment by reducing the benefits of continued drug use. Other factors are perhaps more easily classified as either costs or benefits. Threat of job loss if drug and alcohol use is continued, for example, increases the benefits of seeking treatment as individuals attempt to protect income streams. Reductions in travel costs associated with treatment and increased convenience in terms of times at which treatment can be received both lower the costs of receiving treatment. On the other hand, changes in perceptions about the adverse social

consequences of drug and alcohol use, in terms of legal and/or health problems, loss of job and/or family, and social ostracism, affect the perceived benefits from treatment.

Many variables affect the perceived benefits and costs of treatment for alcohol and drug abuse. Some, such as the degree to which the individual enjoys the addictive substance, are very difficult to measure. Others can be more easily represented by proxy variables. These include demographic and socio-economic attributes such as age, gender, race, employment status, household income, education, location relative to treatment services, marital status, and role as a care-giver to children or others. Other variables may include the individual's personal history of treatment episodes and adverse social outcomes associated with substance abuse and dependency. Still others include indicators of pressure from external sources for treatment such as family, friends, employers, physicians, and clergy.

In this study information is available on demographic and socio-economic characteristics including age, gender, race, marital status, employment status, household income, role as care-giver, and educational level. In addition, data were collected on previous treatment histories and the extent of external pressures for treatment from employers, family, friends, physicians, and clergy.

As noted above, age may be positively or negatively associated with willingness to seek treatment (Kaskutas, et al. (1997), Zule (1997), Fortney, et al. (1995)). On the one hand, other things being equal, older individuals are more likely to have experienced adverse health and social consequences from substance abuse. However, older individuals with substance abuse problems may also be individuals for whom previous treatment has been

unsuccessful and, therefore, for whom the perceived potential benefits from treatment are small.

Previous research does not provide any conclusive empirical insights about the effect of gender on the decision to seek treatment (Kaskutas, et al. (1997), Zule (1997)). Incentives for seeking treatment may or may not differ between men and women because of physical differences. It has been argued that women are less likely to seek treatment because, in the short term, partners pressure them to provide in-the-home services both for the partner and for children rather than seek treatment (Beckman and Amaro (1996)). This suggests that the time spent by women in treatment may have a relatively high opportunity cost. However, if treatment improves the amount and quality of service provided by the woman in the home, these types of costs may be more than offset by benefits to partners from treatment. Thus it is not clear whether gender is associated with an increase or decrease in willingness to seek treatment because of the role of women as care givers. In addition, in this study, information on whether an individual (male or female) is a primary care-giver to others is directly available, although, for the reasons discussed in relation to gender, a priori, it is not clear whether being a care-giver increases or decreases the probability of seeking treatment.

The relationship between race and willingness to seek treatment is also unclear. As previously discussed, the empirical evidence is ambiguous (Kaskutas, et al. (1997), Riley, et al. (1997), Messer, et al. (1996), Fortney (1995)). To the extent that race may be an indicator of education, employment, and income, and to the extent that these variables affect willingness to seek treatment, race may affect willingness to seek treatment. In addition, in some circumstances, as on Native American reservations, race may be an indicator of

availability of information about treatment services and access to treatment services (Riley, et al. (1997)). However, it is not clear whether, in general, race per se will have any impact on willingness to seek treatment.

Marital status may also be important (Steinberg, et al. (1997), Fortney, et al. (1995), Carroll and Rounsaville (1992)). Married individuals (or individuals with similar living arrangements), as opposed to those who are single or divorced, often receive pressure from spouses to mitigate substance abuse behavior which raises the benefits of seeking treatment. If children are involved or other dependents are part of the family, the spouse may also be able to provide care for those dependents while the individual receives treatment, thereby reducing costs associated with treatment.

Employment status may also have ambiguous effects on willingness to seek treatment (Zule (1997), Carroll and Rounsaville (1992), Kleyn and Lake (1990)). Individuals with substance abuse problems who, in the absence of treatment, face the risk of losing their jobs may have substantial incentives to seek treatment because of the perceived benefits in terms of protecting future income streams. However, some employed individuals may face the risk of losing those jobs, or opportunities for advancement, if they do seek treatment because of potential adverse employer reactions to the discovery that their employees have substance abuse problems.<sup>9</sup> Lost income because of time off from work to receive treatment also raises

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<sup>9</sup> This raises a question about opportunistic behavior on the part of individuals with substance abuse problems. If an employer is supportive and an individual seeks treatment but chooses to return to chemical consumption, then the resulting loss of productivity raises costs to the employer. The NIH (1998) has estimated that 45.7% of the costs of alcohol abuse are related to lost productivity due to alcohol-related illnesses. This is a risk an employer chooses to take and if other employees have behaved opportunistically in the past, it could affect the attitude the employer has toward treatment. If this is the case then the individual may face a loss of earning potential not directly attributable to his own behavior.

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the costs of seeking treatment. Thus, it is not clear whether being employed increases or decreases the probability that an individual will seek treatment.

Similar ambiguities exist with respect to household income. Individuals with higher incomes are likely to face larger losses from continued substance abuse in terms of job loss and professional reputation stigmas. However, higher incomes may imply higher opportunity costs of receiving treatment services in terms of lost income and time away from the job during treatment. This may be especially important for individuals with extensive job responsibilities. For similar reasons, the effects of education on willingness to seek treatment are also unclear. In general, individuals with higher levels of education have higher income earning potential but also have higher opportunity costs of time. Higher levels of education may also imply that individuals have greater cognitive abilities to assess the consequences of continued substance abuse and, therefore, that those persons with higher levels of education are more likely to seek treatment. Information on education levels is directly available within the data set employed for this study therefore the effect of educational levels on the decision to seek treatment services is analyzed.

Pressures from external sources may also be important factors in determining willingness to seek treatment (Steinberg, et al. (1997), Hasin (1994), Carroll and Rounsaville (1992), Weisner (1990)). At least five sources of external pressure may matter: family, friends, employers, physicians, and clergy. Although, there is some evidence that external pressure may be counterproductive (Beckman and Amaro (1986), Davis (1997)), increased pressure from family for treatment seeking, (through the threat of divorce, legal intervention, etc. in the absence of treatment seeking, and credible promises of support through the

treatment process), friends (through threat of withdrawal of support for, or tolerance of, substance abuse and support for treatment), employers (though threat of job loss, etc., in the absence of treatment), physicians (through threat of adverse health consequences), and clergy (through the promise of support while treatment is received) can increase the perceived benefits of treatment.

Finally, the effect of previous treatment episodes is also ambiguous (Zule (1997), Messer, et al. (1996), Carroll and Rounsaville (1992)). If the individual has received treatment in the past, the perceived costs of receiving treatment may be lower given that the individual knows what to expect from the withdrawal process and treatment facility. However, individuals who have previously received treatment but were not successful in avoiding substance abuse behavior may also perceive the potential benefits of treatment to be lower. It is also worth noting that a previous history of receiving treatment may be positively correlated with indicators of external pressure for treatment. Individuals whose family, friends, employers, physicians, and clergy are currently encouraging them to seek treatment may also have experienced similar encouragement in the past and, therefore, may have a past history of treatment.

The ambiguous findings of the previous research regarding the above variables indicates that further research is necessary to examine the potential role these variables play in determining the individual's decision to seek treatment services and consequently, the perceived benefits and costs of treatment, an objective this study seeks to accomplish. The next chapter discusses the characteristics of the data set available for this study and provides

variable descriptions, summary statistics, and sample frequencies of the variables included the analysis.

## CHAPTER 4

### DATA

This purpose of this chapter is to describe the population considered for this study, the survey methods, the survey instrument and its limitations, and characteristics of the data set.

#### The Population and Survey Methods

The data for this study are drawn from a survey of 13,804 non-institutionalized adults (ages 18 to 65) residing in the state of Montana and the rural communities of Colorado. Conducted by the Survey Research Unit of the Colorado Department of Public Health and Environment from August 1996 through June 1997, the survey was designed to estimate the prevalence of alcohol and drug abuse and to assess the treatment demand for publicly sponsored alcohol and drug treatment programs (McAuliffe, et al. (1994), Morey, et al. (1995)). Using a computer aided telephone survey system to randomly select respondents, the average response rate for the sample was 80 percent using the Council of American Survey Research Organization's (CASRO) computation method. Over-sampling of Native American households was conducted to ensure adequate representation for this group. As a result, low-income households were also over-sampled due to the prevalence of these

households in the on-reservation Native American population. Over-sampling of Billings, the largest urban area in Montana, was also conducted to capture information on prevalence rates for use of substances such as opiates, which tend to be very low in Montana.

### The Survey Instrument and Data Limitations

The data utilized in this study depend on the reliability of substance abuse and dependency diagnoses determined by a computer algorithm implementing the Diagnostic and Statistical Manual of Mental Disorders, Volume III-R (DSM III-R) criterion and the American Society of Addiction Medicine (ASAM) Patient Placement Criteria. While the DSM III-R criterion have been shown to accurately diagnose substance abuse disorders 80% of the time (Aktan, et al. (1997)), inherent difficulties in using the DSM III-R as a diagnostic tool exist. The additional limitation of self report inventories regarding substance use complicates the ability to accurately diagnose substance use disorders.

The survey was limited to those households who had at least one phone and at least one adult in residence between the ages of 18 and 65 therefore those households without phones or adults in the appropriate age category were excluded from the survey. The possibility of some households containing more than one phone line increased the likelihood of being selected for the survey, and a possibility for over sampling of unemployed and older individuals who remain at home also exists.

### The Data

Within the general adult population (n=13,804), according to the DSM III-R and ASAM criterion, 1141 adults were diagnosed as suffering from current alcohol and/or drug disorders and therefore identified as having a current need for treatment. Of these, 1087 observations provided sufficient information to be included in the study. Table 1 provides definitions of the variables used in the analysis and table 2 presents summary statistics for the total adult sample. Table 3 provides variable frequencies within the total adult sample and includes frequencies for subgroups of low and high-income households, males and females, low-income males and low-income females, high-income males and high-income females, and employed and unemployed individuals.

Table 3 provides information on treatment history and current demand for treatment services. In this study the demand for treatment services is measured as follows. Individuals were asked if they were willing or not to seek treatment for their substance abuse disorders. If they indicated yes, then they were considered as having a current demand for treatment.

In the total adult sample (n = 1087), 219 individuals (20.1 percent of the sample) had a prior history of receiving treatment services with 8.1 percent currently demanding treatment. Of those currently demanding treatment, 85 individuals (7.8 percent of the total adult sample) had prior treatment histories while 3 individuals (0.3 percent) had no prior treatment history. Of those individuals not currently demanding treatment, 134 (12.3 percent of the total adult sample) had prior treatment histories and 865 individuals (79.6 percent) did not have a history of prior treatment episodes.

Table 1. Variable Descriptions.

<u>Variable Name</u>	<u>Description</u>
Demand	A dummy variable that takes the value of 1 if the individual expressed a current desire to receive treatment for their alcohol and/or drug disorders, and 0 otherwise.
Age	Age in years.
Age Squared	Age in years squared.
Gender	A dummy variable that takes on the value of 1 if male, and 0 otherwise.
Race	A dummy variable that takes on the value of 1 if Native American, and 0 otherwise.
Married	A dummy variable that takes on the value of 1 if married or living in a marriage type of relationship, and 0 otherwise.
Employed	A dummy variable that takes on the value of 1 if employed full or part time, and 0 if unemployed and part of the labor force or not currently participating in the labor force. (n=840 for full-time, n=146 for part-time, n=101 for unemployed)
Income	A midline value of the income variable, in \$10K increments beginning at \$5000.
Care Giver	The number of children under 18 that the individual cares for full time.
High School	A dummy variable that takes on the value of 1 if the individual graduated high school, and 0 otherwise.
College	A dummy variable that takes on the value of 1 if the individual attended a two-year college or trade school, and 0 otherwise. (23.8 percent of these individuals hold a degree)
Graduate	A dummy variable that takes on the value of 1 if the individual graduated with a Bachelors degree or higher, and 0 otherwise.
Family	A dummy variable that takes on the value of 1 if the individual reported receiving pressure from a family member about their substance use, and 0 otherwise.
Friends	A dummy variable that takes on the value of 1 if the individual reported receiving pressure from a friend about their substance use, and 0 otherwise.
Employer	A dummy variable that takes on the value of 1 if the individual reported receiving pressure from an employer about their substance use, and 0 otherwise.
Doctor	A dummy variable that takes on the value of 1 if the individual reported receiving pressure from a doctor or clergy member about their substance use, and 0 otherwise.

Table 2. Summary Statistics.

Variable	Total Adult Sample n = 1087			
	Mean	Standard Deviation	Minimum Value	Maximum Value
Demand	.08	.27	0	1
Age	32.7	10.1	18	65
Age Squared	1168.9	730.2	324	4225
Gender	.65	.48	0	1
Race	.13	.34	0	1
Married	.45	.50	0	1
Employed	.90	.29	0	1
Income	26251.2	14223.2	5000.0	45000.0
Care Giver	.74	1.19	0	9
High School	.29	.46	0	1
College	.39	.49	0	1
Graduate	.24	.43	0	1
Family	.43	.50	0	1
Friends	.19	.39	0	1
Employer	.09	.29	0	1
Doctor	.14	.34	0	1
History of Treatment	.20	.40	0	1

Table 3. Frequency of Variables.

Variable	Total Adults	Low Income	High Income	Males	Females	Low-Income Males	Low-Income Females	High-Income Males	High-Income Females	Employed	Unemployed
	n = 1087	n = 411	n = 676	n = 705	n = 382	n = 220	n = 191	n = 485	n = 191	n = 986	n = 101
Demand	8.1	11.7	5.9	7.8	8.6	12.3	11.0	5.8	6.3	6.2	26.7
Gender	64.9	53.5	71.7	-	-	-	-	-	-	66.4	49.5
Race	13.4	16.8	11.4	11.8	16.5	15.9	17.8	9.9	15.2	10.7	39.6
Married	45.5	30.7	54.4	47.1	42.4	32.7	28.3	53.6	56.5	45.7	42.6
Employed	90.7	84.7	94.4	92.9	86.7	86.8	82.2	95.7	91.1	-	-
Care Giver	35.8	33.6	37.1	30.5	45.6	22.3	46.6	34.2	44.5	34.8	44.6
High School	29.3	29.4	29.1	30.4	27.2	30.0	28.8	30.5	25.7	28.8	33.7
College	39.1	41.6	37.6	36.0	44.7	37.7	46.1	35.3	43.5	39.1	38.7
Graduate	23.6	15.8	28.4	25.3	20.7	17.7	13.6	28.7	27.7	24.7	12.9
Family	43.1	48.4	39.8	44.8	40.0	50.0	46.6	42.5	33.0	41.0	63.4
Friends	18.8	23.6	15.8	18.9	18.6	25.5	21.5	15.9	15.7	17.5	30.7
Employer	9.1	13.6	6.4	9.6	8.1	15.5	11.5	7.0	4.7	8.1	18.8
Doctor	13.7	17.8	11.2	14.6	11.8	19.5	15.7	12.6	7.9	12.4	26.7
History of Treatment	20.1	27.3	15.8	19.6	21.2	27.7	26.7	15.9	15.7	18.6	35.6

In the low-income sample, 411 individuals (38 percent of the total adult sample) were members of households with per capita incomes of less than \$20,000. Among these low-income households, 112 individuals, or 27.3 percent of low-income households, had a prior history of treatment and 11.7 percent reported a current desire for treatment services. The high-income sample (those households with per capita incomes greater than \$20,000) consists of 676 individuals or 62 percent of the total adult sample. In the high-income sample, 107 individuals, or 15.8 percent of high-income households, have prior histories of treatment and 5.9 percent of those individuals in high-income households currently demand treatment. The proportion of individuals that have prior treatment histories who are currently demanding treatment is greater among the low-income population than among the high-income population. This is largely because Native Americans, who are more likely to seek treatment (Riley, et al. (1997)), constitute a larger proportion of the individuals in low-income households.

Table 3 also shows the total adult sample (n=1087) consists of 705 males and 382 females, with 138 men (19.6 percent of men) having prior treatment histories and 81 women (21.2 percent of women) having treatment histories. The percentage of females currently demanding treatment services (8.6 percent) is slightly higher than the percentage of males (7.8 percent). The male and female samples were further divided into low and high-income groups. In the low-income sample, 220 individuals were men (53.5 percent of the low-income sample), of which 61 men (27.7 percent of low-income men) had prior treatment histories and 27 men (12.3 percent) currently expressing a desire for treatment. The number of women from low-income households was 191 (46.5 percent of the low-income sample) of

which 51 (26.7 percent of low-income women) had a prior history of treatment and 21 (11 percent) currently demanded treatment services. The high-income sample included 485 men (71.7 percent), of which 77 (15.9 percent) reported prior treatment episodes and 28 (5.8 percent) currently demanded treatment. The high-income group also included 191 women (28.3 percent of the high-income sample), 30 of which (15.7 percent of high-income women) reported previous treatment histories and 12 (6.3 percent) currently demanded treatment services. Preliminary indications within these subgroups imply a possible positive relationship between previous treatment history and current demand for treatment services, a result that would be consistent with studies by Zule (1997), Messer (1996), and Carroll and Rounsaville (1992) who reported that current treatment seekers were more likely to have previous involvement with treatment services.

The total adult sample consists of 986 employed individuals (90.7 percent of the total adult sample) and 101 unemployed individuals (9.3 percent of the sample). Of the employed individuals, 183 (18.6 percent of those employed) reported prior treatment history and 61 (6.2 percent) currently demanded treatment. Of the unemployed individuals, 36 (35.6 percent of the unemployed) reported having sought treatment at some point in their lifetime and 27 (26.7 percent) currently demanded treatment services. The larger proportion of unemployed individuals with previous treatment histories is probably due to the over-sampling of Native American households but is not inconsistent with studies by Zule (1997), Kleyn and Lake (1990), and Stokes (1977) that reported unemployed individuals were more likely to enter treatment. The employed and unemployed subgroups were not further divided by income or

gender because sample sizes became too small for reliable results to be obtained from statistical analyses.

External sources of pressure regarding substance use may be an important influence on treatment seeking behavior, as was previously reported by Steinberg, et al. (1997), Hasin (1994), Carroll and Rounsaville (1992), and Weisner (1990). Table 3 provides information on the external pressure variables including Family, Friends, Employer, and Doctor. It should be noted that the Doctor variable also contains reported pressure from clergy members regarding substance use. In the total adult sample 43.1 percent of those with treatment needs reported receiving pressure about their substance use from family, 18.8 percent from friends, 9.1 from employers, and 13.7 from physicians and clergy members. In the low-income sample, 48.4 percent received pressure from family, 23.6 percent from friends, 13.6 from employers, and 17.8 percent from and physicians and clergy members. In the high-income sample 39.8 percent reported pressure from family, 15.8 reported pressure from friends, 6.4 reported pressure from employers, and 11.2 reported pressure from physicians and clergy members. The percentage of individuals with treatment needs reporting pressure from these sources in aggregate was larger in the low-income sample than in the high-income sample suggesting that low-income individuals face greater opposition to their substance use from individuals with which they have close relationships. A higher percentage of low-income individuals also reported previous treatment histories suggesting that external pressure from personal relationships may play a part in previous treatment seeking episodes.

Previous research does not provide conclusive evidence regarding the role of gender in the decision to seek treatment. However, males reported higher pressure than females

suggesting that gender may play a role in determining which sources of pressure have an influence on the decision to seek treatment. Low-income males and females also reported receiving greater pressure than their high-income counterparts, which also suggests that low-income individuals face greater opposition to their substance use.

Unemployed individuals with treatment needs also reported receiving much higher pressure about their substance use than employed individuals. Consequently, in this sample a larger proportion of the unemployed currently demanded treatment services, a finding that is consistent with the studies by Zule (1997), Kleyn and Lake (1990), and Stokes (1977), which all reported that unemployed individuals were more likely to enter treatment. This may be a function of increased pressure on individuals regarding their substance abuse but it may also be due to lower opportunity costs of their time.

Building on the theoretical and empirical work discussed in previous chapters, the objective of this study is to assess the influence the above variables may have on the decision to seek treatment services. The next chapter introduces the empirical models and estimation techniques employed in this study.

## CHAPTER 5

## ESTIMATION MODELS, METHODS, AND ISSUES

This chapter presents the estimation models and discusses estimation methods, properties of the estimators and error terms, and the employment of the Likelihood Ratio test in the context of testing for structural differences between sample subgroups. A weighting strategy for the data is briefly discussed.

Empirical Models

The theoretical discussion presented in chapter 3 indicates that it is appropriate to specify an empirical model that seeks to explain the decision to seek treatment as a function of the variables that measure or serve as proxies for the benefits and costs of seeking treatment. A general specification of such a model is as follows:

Willingness to Seek Treatment = f(Age, Employment Status, Gender, Marital Status,  
Race, Travel and Distance Barriers, Perceived Severity  
of the Substance Abuse Problem, History of  
Treatment, Social Consequences, Internal/External  
Pressure to Seek Treatment)

All of the above explanatory variables have been identified as possible determinants of the treatment seeking decision. However, as previously noted, information is not available for all of these variables in the data set employed for this study. Therefore, travel and distance barriers, perceived severity of the substance abuse problem, and social consequences are not included in the analysis. Additional information is available regarding household income levels, child care responsibilities, and education levels and will be included in the analysis. Therefore, in this analysis, the initial estimation model is specified as follows:

$$\begin{aligned} \text{Willingness to Seek Treatment} = & \beta_1 + \beta_2 \text{Age} + \beta_3 \text{Age Squared} + \beta_4 \text{Gender} + \beta_5 \text{Race} \\ & + \beta_6 \text{Married} + \beta_7 \text{Care Giver} + \beta_8 \text{Employed} + \beta_9 \text{Income} \\ & + \beta_{10} \text{High School} + \beta_{11} \text{College} + \beta_{12} \text{Grad} + \beta_{13} \text{Family} \\ & + \beta_{14} \text{Friends} + \beta_{15} \text{Employer} + \beta_{16} \text{Doctor} + \epsilon \end{aligned}$$

Fortney, et al. (1995) reported a quadratic relationship between age and treatment seeking therefore the variable Age Squared is also included in the empirical model. The Income variable is included as a proxy for the opportunity costs an individual faces if the individual must take time away from their job if the decision to seek treatment is made. A measure of child care responsibilities, the Care Giver variable, is included to assess the effect of child care issues on the decision to seek treatment. As previously discussed, the effect of educational levels on the willingness to seek treatment could be positive or negative. To measure the possible effects of educational status on the treatment decision, three education dummy variables are also included in the estimation model.

The final four variables are included in the model to account for external pressure. In preliminary regression models not reported in this study, these external pressure variables

were combined into one additive variable ranging from 0, no pressure from outside sources, to 4, pressure from all outside sources. This aggregated measure of pressure was consistently positive and significant, suggesting that increasing the pressure to substance users from outside sources increased a person's willingness to seek treatment services. This study, however examines the effects of individual sources of external pressure, family, friends, employers, physicians, and clergy members on the individual's decision to seek treatment.

A second model specification includes the History of Treatment variable but excludes the pressure variables Family, Friends, Employer, and Doctor. In preliminary models (also not reported here), when History of Treatment was included in the regressions with the pressure variables, the treatment history coefficient is positive and significant, which is consistent with Zule, et al. (1997), Messer, et al. (1996), and Carroll and Rounsaville (1992). However, the pressure variable coefficients become insignificant while other parameter estimates remain relatively unchanged, indicating prior treatment history is correlated in some way with the pressure variables.

A possible explanation for this multicollinearity between the History of Treatment and pressure variables is that individuals with previous treatment histories may also have been subject to prior external pressure to obtain treatment. Thus, in addition to any other role it serves, a history of previous treatment may be an effective indicator that in the past, and more recently, an individual has been confronted with external pressures to seek treatment. Given this discussion, the second model estimated is specified as:

$$\begin{aligned} \text{Willingness to Seek Treatment} = & \beta_1 + \beta_2 \text{Age} + \beta_3 \text{Age Squared} + \beta_4 \text{Gender} + \beta_5 \text{Race} \\ & + \beta_6 \text{Married} + \beta_7 \text{Care Giver} + \beta_8 \text{Employed} + \beta_9 \text{Income} \\ & + \beta_{10} \text{High School} + \beta_{11} \text{College} + \beta_{12} \text{Grad} \\ & + \beta_{13} \text{History of Treatment} + \epsilon \end{aligned}$$

Estimation results are reported in chapter 6 of this thesis.

### Estimation Methods and Issues

The decision to seek treatment is a discrete choice variable; a person either decides to seek treatment or not to seek treatment. Multinomial logistic (logit) regression models provide a natural framework for empirically assessing the probable effects of multiple factors on such discrete choices where the categorical choice variable can be attributed a zero (no treatment sought) or one (treatment is sought). The use of Ordinary Least Squares estimation techniques is inappropriate in this context since OLS estimation methods allow parameter estimate values to range outside the zero-one interval necessary to assess probable effects on the choice variable from independent variables within the model.

The multinomial logit model is generally specified as follows. Letting  $Y$  denote the binary choice variable:

$$\text{Prob}(Y=1) = \frac{e^{\beta'x}}{1 + e^{\beta'x}}$$

where  $e$  is the exponential,  $x$  is a vector of independent or explanatory variables and  $\beta$  is a vector of parameters (Greene (2000)). The logit model is non-linear in its parameters and, therefore, estimated iteratively using maximum likelihood methods. This method produces

parameter estimates that have the highest probability of generating the observed values of the dependent variable, here the willingness to seek treatment.

In this study, model parameters are estimated using the logit maximum likelihood procedures in LIMDEP based on Newton's method of scoring (Greene (2000)). As Greene notes, the maximum likelihood estimators have the properties of consistency, and asymptotic unbiasedness, efficiency, and normality.

Within the sample subgroups of low and high-incomes, males and females, low-income males and females, high-income males and females, and the employed and unemployed, Likelihood Ratio tests are employed to test for structural differences in model specifications among the subgroup members. For large sample sizes the test statistic is specified as:

$$-2[L(\beta_R) - L(\beta_{UR})] \sim \chi^2_m$$

where  $L(\beta_R)$  represents the maximum value of the log likelihood function when restrictions to the model are applied,  $L(\beta_{UR})$  represents the maximum value when the restrictions do not apply, and  $m$  is the number of restrictions imposed (Greene (2000)). The test statistic is distributed chi-square with degrees of freedom equal to the number of restrictions imposed and tested at the 5 percent level of significance.

The null hypothesis tested for this study is whether the treatment seeking decision is identical for each subgroup estimated. A restricted model is specified with the variable in question omitted; for example, the Gender variable is omitted for the male and female subgroups in the restricted model. The maximum likelihood value is calculated for the total sample using this restricted model and compared to the maximum likelihood value for the

unrestricted model, which in this case is the sum of the likelihood ratios calculated separately for the male and female regressions. If the calculated test statistic is statistically significantly different from zero in the  $\chi^2$  distribution with fifteen degrees of freedom, we can reject the null and conclude that the treatment decision is different for the subgroups, and in this example, for men and women. The Likelihood Ratio test is conducted for the subgroups low and high-income, men and women, low-income men and women, high-income men and women, and employed and unemployed.

#### Weighting Strategy

According to Riley, et al. (1997), in order to more accurately represent the respective populations, a weighting strategy was developed to integrate the data from the over sampled areas of Montana, namely the Billings and Native American samples, into the general data set.<sup>10</sup> Therefore this study employs a weighted logit model to obtain coefficient estimates for the explanatory variables included in empirical models 1 and 2 (Greene (2000)). Estimation results for each of the populations discussed are presented in chapter 6.

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<sup>10</sup> For a detailed discussion of this weighting strategy, refer to Appendix C in Riley, et al. (1997).

## CHAPTER 6

### EMPIRICAL RESULTS

This chapter presents results obtained employing the empirical models and estimation methods discussed in the previous chapter. Models 1 and 2 are estimated for the entire population then for low and high-incomes with results reported in tables 4 and 5. Tables 6 through 9 report results using model 1 for the following subgroups respectively, men and women, low-income men and high-income men, low-income women and high-income women, and the employed and unemployed. Major empirical findings are summarized at the end of the chapter.

A common problem with cross-sectional data is non-uniformity of the error variances known as heteroscedasticity. Logit estimation models generate inconsistent estimators when heteroscedasticity exists within the data which leads to erroneous hypothesis tests for the coefficients if ignored. Graphical and numerical analysis showed little evidence of heteroscedasticity in the data set utilized in this study.

Table 4. Total Adult Sample and Low and High-Income Households:  
Model 1 (with Pressure Variables).

Variable	Total Adult Sample n=1087	Low Income Sample n=411	High Income Sample n=676
Constant	-5.88** (2.43)	-9.21** (4.19)	-5.54 (3.78)
Age	.22 (.14)	.22 (.22)	.22 (.21)
Age Squared	-.003 (.002)	-.003 (.003)	-.003 (.003)
Gender	-.29 (.40)	-.03 (.68)	-.40 (.56)
Race	1.13* (.62)	1.83** (.84)	.61 (1.07)
Married	.49 (.41)	1.52** (.64)	.03 (.60)
Care Giver	.33 (.40)	.28 (.70)	.53 (.55)
Employed	-1.47** (.54)	-2.23** (.67)	-.50 (1.19)
Income	-.00001 (.00002)	-1.53** (.65)	.00001 (.00003)
High School	.28 (.63)	2.77** (1.29)	-.84 (.78)
College	-.70 (.65)	2.08* (1.24)	-2.31** (.86)
Graduate	-.82 (.74)	3.19** (1.47)	-2.45** (.94)
Family	.28 (.40)	.76 (.77)	.05 (.53)
Friends	1.09** (.44)	.71 (.77)	1.26** (.58)
Employer	1.05** (.53)	1.63** (.81)	.76 (.75)
Doctor	.18 (.50)	.11 (.69)	.43 (.69)
Log Likelihood Function	-130.87	-49.61	-72.60
Likelihood Ratio Test	-2[-130.87 - (-49.61-72.60)] = 17.32 ~ $\chi^2_{16}$		

Notes: Standard deviations presented in parentheses.

\*\* Significant at the 5% level

\* Significant at the 10% level

Table 5. Total Adult Sample and Low and High-Income Households:  
Model 2 (with History of Treatment).

Variable	Total Adult Sample n=1087	Low Income Sample n=411	High Income Sample n=676
Constant	-10.82** (2.73)	-10.35** (4.06)	-14.07** (5.42)
Age	.36** (.16)	.12 (.23)	.58** (.27)
Age Squared	.005** (.002)	-.001 (.003)	-.008** (.004)
Gender	.02 (.47)	.30 (.81)	-.24 (.76)
Race	.89 (.75)	3.34** (1.14)	-.23 (1.40)
Married	.006 (.49)	1.80** (.82)	-.76 (.92)
Care Giver	.35 (.49)	.38 (.81)	.16 (.82)
Employed	-2.09** (.77)	-3.12** (.95)	-2.43 (2.24)
Income	.00001 (.00001)	-1.37* (.77)	.00001 (.00004)
High School	.64 (.72)	4.36** (1.55)	-1.03 (1.13)
College	-.28 (.73)	2.69** (1.41)	-2.11* (1.18)
Graduate	-1.04 (.82)	4.56** (1.69)	-3.13** (1.31)
History of Treatment	5.30** (.85)	5.26** (1.21)	7.48** (2.61)
Log Likelihood Function	-80.74	-32.30	-37.11
Likelihood Ratio Test	$-2[-80.74 - (-32.30 - 37.11)] = 22.66^{\ddagger} \sim \chi^2_{13}$		

Notes: Standard deviations presented in parentheses.

\*\* Significant at the 5% level

\* Significant at the 10% level

‡ Significant at the 5% level

Table 6. Males and Females: Model 1.

Variable	Total Adult Sample n=1087	Male Sample n=705	Female Sample n=382
Constant	-5.96** (2.45)	-6.55* (3.49)	-8.79* (5.31)
Age	.21 (.14)	.26 (.19)	.35 (.37)
Age Squared	-.003 (.0020)	-.003 (.003)	-.006 (.006)
Race	1.12* (.62)	.64 (.95)	1.75* (.95)
Married	.48 (.41)	.20 (.56)	1.89** (.88)
Care Giver	.36 (.39)	.32 (.56)	.92 (.70)
Employed	-1.51** (.54)	-1.77** (.78)	-1.77** (.83)
Income	-.00001 (.00002)	-.00002 (.00002)	.00001 (.00003)
High School	.30 (.63)	.49 (.86)	-.97 (1.24)
College	-.67 (.65)	-1.01 (.93)	-.92 (1.13)
Graduate	-.80 (.74)	-1.29 (1.04)	-.22 (1.32)
Family	.25 (.40)	.28 (.53)	.21 (.73)
Friends	1.12** (.43)	1.45** (.56)	.33 (.81)
Employer	1.05** (.53)	.07 (.78)	3.47** (.97)
Doctor	.15 (.46)	.02 (.60)	.75 (.79)
Log Likelihood	-131.12	-75.49	-51.07
Likelihood Ratio Test	$-2[-131.12 - (-75.49 - 51.07)] = 9.12 \sim \chi^2_{15}$		

Notes: Standard deviations presented in parentheses.

\*\* Significant at the 5% level

\* Significant at the 10% level

Table 7. Low-Income Males and Low-Income Females: Model 1.

Variable	Total Low-Income Sample n=411	Male Sample n=220	Female Sample n=191
Constant	-9.18** (4.14)	-7.28 (6.67)	-16.29** (6.92)
Age	.24 (.22)	.11 (.34)	.52 (.39)
Age Squared	-.003 (.003)	-.008 (.005)	-.006 (.006)
Race	1.84** (.83)	.91 (1.76)	2.48** (1.22)
Married	1.52** (.64)	1.87* (1.07)	3.04** (1.39)
Care Giver	.29 (.68)	-1.53 (1.41)	1.96* (1.22)
Employed	-2.24** (.65)	-3.48** (1.28)	-1.77* (1.07)
Income	-1.53** (.64)	-1.26 (.94)	-2.10* (1.24)
High School	2.77** (1.29)	4.44** (2.33)	1.70 (1.95)
College	2.08* (1.24)	1.74 (2.21)	1.65 (1.68)
Graduate	3.19** (1.47)	4.19* (2.31)	1.24 (3.07)
Family	.76 (.75)	1.60 (1.27)	.68 (1.20)
Friends	.71 (.76)	1.28 (1.16)	-.50 (1.20)
Employer	1.64** (.81)	1.09 (1.40)	2.05 (1.47)
Doctor	.11 (.68)	-.57 (1.24)	1.84 (1.19)
Log Likelihood	-49.60	-22.51	-20.19
Likelihood Ratio Test	$-2[-49.60 - (-22.51 - 20.19)] = 13.80 \sim \chi^2_{15}$		

Notes: Standard deviations presented in parentheses.

\*\* Significant at the 5% level

\* Significant at the 10% level

Table 8. High-Income Males and High-Income Females: Model 1.

Variable	Total High-Income Sample n=676	Male Sample n=485	Female Sample n=191
Constant	-6.02 (3.76)	-5.86 (4.54)	-18.12 (18.62)
Age	.23 (.22)	.27 (.25)	1.02 (1.34)
Age Squared	-.003 (.003)	-.003 (.004)	-.017 (.021)
Race	.50 (1.07)	.75 (1.26)	.16 (4.41)
Married	.06 (.60)	-.68 (.84)	1.37 (1.84)
Care Giver	.54 (.56)	1.48* (.81)	1.31 (1.46)
Employed	-.52 (1.08)	-1.44 (1.38)	.36 (5.56)
Income	.00001 (.00003)	-.00001 (.00004)	.00006 (.00009)
High School	-.79 (.78)	-.57 (.94)	-5.87 (4.91)
College	-2.26** (.85)	-2.04** (1.03)	-5.35 (4.36)
Graduate	-2.42** (.94)	-3.46** (1.42)	-3.74 (4.42)
Family	.02 (.52)	.10 (.65)	-1.31 (1.68)
Friends	1.31** (.58)	1.79** (.75)	1.83 (1.70)
Employer	.74 (.75)	-1.29 (1.26)	4.90** (1.97)
Doctor	.42 (.69)	.97 (.81)	1.07 (2.08)
Log Likelihood	-72.84	-44.09	-19.06
Likelihood Ratio Test	$-2[-72.84 - (-44.09-19.06)] = 19.38 \sim \chi^2_{15}$		

Notes: Standard deviations presented in parentheses.

\*\* Significant at the 5% level

\* Significant at the 10% level

Table 9. Employed and Unemployed Individuals: Model 1.

Variable	Total Sample n=1087	Employed Sample n=986	Unemployed Sample n=101
Constant	-6.94** (2.46)	-6.30** (2.75)	-7.74 (5.61)
Age	.20 (.14)	.17 (.16)	.12 (.31)
Age Squared	-.003 (.002)	-.002 (.002)	-.001 (.004)
Gender	1.27** (.59)	1.25* (.72)	1.45 (1.52)
Race	-.34 (.39)	-.39 (.44)	1.36 (1.20)
Married	.55 (.40)	.22 (.46)	4.17** (1.65)
Care Giver	.40 (.38)	.38 (.44)	.55 (1.29)
Income	-.00002 (.00002)	.00004 (.00002)	-.0002** (.00006)
High School	.27 (.62)	-.03 (.68)	.92 (2.12)
College	-.67 (.64)	-1.29* (.73)	2.54 (2.12)
Graduate	-.84 (.74)	-1.24 (.79)	1.02 (3.28)
Family	.35 (.39)	.22 (.43)	.77 (1.29)
Friends	1.13** (.42)	1.06** (.48)	-.38 (1.40)
Employer	1.10** (.51)	1.07* (.60)	2.80* (1.52)
Doctor	.17 (.45)	.10 (.54)	2.08 (1.33)
Log Likelihood	-134.16	-109.73	-19.42
Likelihood Ratio Test	-2[-134.16 - (-109.73-19.42)] = 10.02 ~ $\chi^2_{15}$		

Notes: Standard deviations presented in parentheses.

\*\* Significant at the 5% level

\* Significant at the 10% level

### Total Adult Sample

Two models are estimated for the total adult sample. Model 1 includes the pressure variables but excludes treatment history. Model 2 includes treatment history as an explanatory variable and excludes the pressure variables. Results are presented in tables 4 and 5 for models 1 and 2 respectively.

#### Model 1

The coefficient associated with the variable Race is positive and statistically significant, indicating that, *ceteris paribus*, Native Americans are more likely to seek treatment for substance abuse and dependency than non-Native Americans. As Riley et al. (1997) have noted, this could be because, particularly in reservation settings, Native Americans may have access to more extensive information and counseling about treatment programs and, therefore, face lower transactions costs in obtaining treatment.

The Employed variable is negative and statistically significant. This finding is consistent with the hypothesis that when compared to the potential benefits from seeking treatment, the opportunity costs of seeking treatment are perceived to be higher by individuals who are employed. This result is also supported by Zule, et al. (1997), Kleyn and Lake (1990), and Stokes (1977) who reported that employed individuals were less likely to seek treatment. Income and educational level appear to have no effect on the treatment decision for the total adult sample.

External sources of pressure may have a statistically significant effect on the likelihood that an individual will seek treatment. The results indicate that in the total adult sample,

pressure from an employer has a positive and statistically significant effect on the likelihood of seeking treatment. The coefficient associated with the variable Friends is also positive and significant. However, pressures from family, physicians, and clergy members do not have a statistically significant effect (although the coefficients for the related variables are positive). These results indicate that, all else equal, pressure from external sources is a statistically significant determinant of willingness to seek treatment. However, the nature of the external source may be important. Neither pressure from the family in general nor the influences of physicians and clergy members appear to be statistically significant for the total adult sample. However, pressure from friends and employers does appear to have a statistically significant positive effect. These results are consistent with the findings of Hasin (1994) and Carroll and Rounsaville (1992) that external pressures increase willingness to seek treatment, but are also not inconsistent with the findings of Beckman and Amaro (1986) who concluded that sometimes external pressures could deter treatment seeking behavior.

### Model 2

This model, reported in table 5, indicates the variables Age and Age Squared are positive and significant at the 5% level whereas in model 1 their coefficients were statistically insignificant. The values of the coefficients (0.36 for Age and 0.005 for Age Squared) imply that the probability of seeking treatment increases at an increasing rate with age. These results are somewhat similar to those reported by Fortney et al. (1995), who estimated that the probability of seeking treatment increases until the age of 42 and declines thereafter, and

of Kaskutas, et al. (1997) who reported the likelihood of seeking treatment was lower for individuals in older age groups.

Race, while still positive, is now insignificant. As noted before, Native Americans are more likely to seek treatment services (Riley, et al. (1997), Towle (1974)), and therefore are more likely to have previous treatment histories. Inclusion of the treatment history variable in this model may void the effect of race on the treatment decision.

The Employed variable is negative and statistically significant at the 5% level although somewhat larger in magnitude in this model. Individuals with previous treatment histories may be more likely to be employed if treatment was initially sought to prevent the loss of a job, and if a return to substance use was indicated, then current decisions to seek treatment may indicate an additional attempt to protect employment and subsequent income.

The History of Treatment coefficient is positive and significant at the 5% level, indicating a higher probability of treatment seeking for individuals who have previously experienced at least one treatment episode, a result that is consistent with Zule, et al. (1997), Messer, et al. (1996), and Carroll and Rounsaville (1992). This implies that all else equal, those individuals with previous treatment histories perceive the benefits of seeking treatment to be larger than opportunity costs they face if treatment is not sought. However, this result is inconsistent with Richman and Smart (1981) who reported the probability of treatment entry decreased with each subsequent admission to a detoxification center. It is important to note that treatment modalities within detoxification centers focus on detoxifying the individual only and do not typically include continued care, substance abuse education, and counseling services (Tellez (2000)). Those individuals entering a detox center may not perceive the

benefits of these types of treatment services to be higher than the opportunity costs they face and, unfortunately, may attribute different treatment modalities to the same category. In this case treatment benefits for all modalities are perceived in the same manner which may decrease the probability of treatment seeking on the whole.<sup>11</sup>

### Low and High-Income Households

Model 1 was estimated for both low and high-income groups as well as the total sample. Parameter estimates are presented in table 4. The Likelihood Ratio test statistic to test the hypothesis that the treatment seeking decision is identical for each subgroup is reported to be 17.32 with 16 degrees of freedom. This implies that the hypothesis is not rejected at the 5% level and thus low-income and high-income individuals do not appear to make the decision to seek treatment in different ways. However, the Likelihood Ratio test based on the model including previous treatment history but excluding the pressure variables provides the opposite result. In table 5, the test statistic is reported to be 22.66 with 13 degrees of freedom which implies that the hypothesis is rejected at the 5% level of significance. Thus, low-income and high-income individuals appear to make the decision to seek treatment services in different ways when prior treatment history is included as an explanatory variable. Results for model 1 and 2 are presented in tables 4 and 5 respectively and discussed below.

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<sup>11</sup> Frequently individuals entering detox programs are required to do so for legal reasons. To account for the possible impact of the legal system on an individual's decision to seek treatment, empirical models not reported here included a variable that measured arrest histories. The coefficient for this variable was never significant and its inclusion did not change the other parameter estimates.

### Model 1

The coefficients on Age, Age Squared, and Gender are insignificant at the 5% level for the low and high-income samples in table 4. The coefficient associated with Race is positive and significant for the low-income sample only which implies, *ceteris paribus*, low-income Native Americans are more likely to seek treatment for substance abuse and dependency than low-income non-Native Americans. As discussed above, this may be because Native Americans have access to more information about treatment programs and counseling services (Riley, et al. (1997)).

Being married (or in a more permanent marriage like relationship) has a statistically significant and positive effect on the willingness to seek treatment within the low-income sample for model 1. Whether or not an individual is a primary provider of care for dependents has no apparent effect on the probability that the individual will seek treatment for substance abuse or dependency in either sample. This suggests that, all else equal, while the benefits from providing treatment for child care providers may be quite large, their opportunity costs of receiving treatment may also be quite substantial therefore these individuals do not seek treatment services.

Being employed has a statistically significant and negative effect on the decision to seek treatment for low-income individuals, a result consistent with Zule, et al. (1997), Kleyn and Lake (1990), and Stokes (1977) who all reported a negative relationship between employment status and treatment seeking. These results suggest that, all else equal, for those

employed in low-income jobs, treatment benefits may be perceived to be smaller than the loss of income if treatment services cannot be received during off-job hours.

The effects of income also differ between the high and low-income samples. For the high-income sample, the Income coefficient is statistically insignificant while in the low-income sample the income coefficient is negative and statistically significant at the 5% level. These findings suggest that, in the low-income sample, *ceteris paribus*, the opportunity costs of receiving treatment increase with income at a rate sufficient to reduce incentives for seeking treatment.

The effect of education differs among population subgroups. In the high-income sample, the coefficients associated with the education variables except high school graduate are negative and significant at the 5% level, suggesting that as education levels increase, the probability of seeking treatment decreases for high-income individuals. This result is consistent with Grossman (1997) who argued those individuals with higher educational levels would not seek health services [treatment] as much as those with lower education levels because these health [treatment] inputs would be utilized more efficiently.

However, in contrast to Grossman (1997), in the low-income sample the coefficients associated with the education variables are positive and generally significant at the 5% level. These results indicate that, all else equal, low-income individuals are more likely to seek treatment as education levels rise. Those with high school diplomas and some college education have a higher probability of seeking treatment than individuals who did not graduate from high school. However, the size of the coefficient associated with College is smaller than the size of the coefficient associated with High School. Thus low-income

individuals with some college education are less likely to seek treatment than low-income individuals with only a high school diploma. Although, the coefficient associated with the variable Graduate is larger than those associated with High School or College, indicating that low-income individuals with baccalaureate or more advanced degrees are more likely to seek treatment.

External sources of pressure may have important effects on the likelihood that an individual will seek treatment. The results in table 4 indicate that for the low-income sample, pressure from an employer has a positive and statistically significant effect on the likelihood of seeking treatment. The coefficient associated with the variable Friends is positive and significant at the 5% level for the high-income sample. These results suggest the nature of the external source is important within different income groups; for low-income individuals, the probability of seeking treatment increases with pressure from employers while the probability increases for high-income individuals when friends pressure them about their substance use. Pressure from family, physicians, and clergy members do not have a statistically significant effect for either income group.

### Model 2

The coefficients on Age and Age Squared are significant at the 5% level with opposite signs for the high-income sample in table 5. Because of the general positive relationship between age and income, and the discussion above regarding previous treatment histories as an attempt to protect income streams, older individuals with larger incomes may perceive the benefits of seeking treatment to be greater. High-income individuals may also be more likely

to have medical insurance coverage for treatment services which lowers the cost of treatment seeking considerably.<sup>12</sup> Gender has no statistically significant effect on the decision to seek treatment services for this sample.

The coefficient for Race is positive and significant at the 5% level for the low income sample only. This implies low-income Native Americans are more likely to seek treatment for substance abuse and dependency than low-income non-Native Americans. As noted above, this may be because Native Americans have access to more information about treatment programs and counseling services (Riley, et al. (1997)).

The coefficient for the Married variable is positive and statistically significant at the 5% level for the low-income sample only, a result also reported for model 1. Being married has no statistically significant effect on the treatment decision for high-income individuals in either model.

Finally, in table 5, the History of Treatment variable is positive and statistically significant at the 5% level for both the low and high-income samples, a result consistent with Zule (1997), Messer, et al. (1996), and Carroll and Rounsaville (1992). The inclusion of prior treatment episodes in the estimation model, as discussed previously, causes the coefficients on the pressure variables to become statistically insignificant while leaving other coefficient estimates relatively unchanged. This may indicate that those with previous treatment histories are more likely to have experienced prior external pressure to obtain treatment. Given this discussion, the treatment history variable will be excluded from the remaining analyses in

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<sup>12</sup> Data on private medical insurance coverage was not available for this study.

order to assess the influence individual external pressure sources may have on the treatment decision.

### Males and Females

Model 1 was estimated for both male and female groups as well as the total sample with results reported in table 6. The hypothesis that the treatment seeking decision is identical for each subgroup is tested with a Likelihood Ratio test statistic and is reported to be 9.12 with 15 degrees of freedom. This implies that the hypothesis is not rejected at the 5% level thus, males and female do not appear to make the decision to seek treatment in different ways. However, parameter estimates for each sample do display differences in statistical significance. Results are presented in table 6 and discussed below.

Neither Age or Age Squared have a statistically significant effect on the treatment decision for men or women, a result consistent with Zule, et al. (1997) but inconsistent with Kaskutas, et al. (1997) who reported persons under the age of 30 were more likely to seek treatment.

The coefficient on Race for women is positive and statistically significant at the 10% level indicating Native American women are more likely to seek treatment. This result is consistent with Riley, et al. (1997) and Towle (1974) who reported Native Americans are more likely to seek treatment, and with Zule, et al. (1997) who found women to be more likely to seek treatment services. However, this result is inconsistent with the findings of Kaskutas, et al. (1997) who reported men to be more likely to seek treatment services.

Being married has a positive and statistically significant effect on treatment seeking only for women. This result is consistent with Carroll and Rounsaville (1992) but contrasts with the results reported by Robinson (1984), Badiet (1976), Beckman (1975), and Lindbeck (1972) who all reported husbands to be effective in delaying treatment entry, and Beckman and Amaro (1996) who reported male partners pressure women to provide in-home services to the family rather than seek treatment. It is possible that married women in this study perceive treatment to improve the quality of services provided in-home and consequently perceive the benefits of seeking treatment to be large. For men, the finding that the coefficient on Married is not statistically significant is inconsistent with Fortney, et al. (1995) who reported married men to be more likely than single men to seek treatment, and Carroll and Rounsaville (1992) who reported marital status to be a significant indicator of treatment seeking behavior. The role of child care does not appear to be a statistically significant influence on the decision to seek treatment for either men or women.

Being employed has a negative and statistically significant effect on the decision to seek treatment for both men and women, a result consistent with Zule, et al. (1997), Kleyn and Lake (1990), and Stokes (1977), but inconsistent with Carroll and Rounsaville (1992). For employed men and women, *ceteris paribus*, the opportunity costs of seeking treatment clearly outweigh the perceived benefits. The roles of income and education do not appear to have a statistically significant effect on the decision to seek treatment services for either men or women.

The effect of external sources of pressure to seek treatment services is different for men and women. For men, pressure from friends increases the probability that treatment is

sought while for women, the pressure from employers increases the willingness to seek treatment. Neither family, physician, or clergy pressure has an effect on men or women to seek treatment.

#### Low-Income Males and Low-Income Females

Model 1 was estimated for both low-income males and females as well as the total low-income sample with results presented in table 7. The Likelihood Ratio test statistic to test the hypothesis that the treatment seeking decision is identical for each subgroup is reported to be 13.80 with 15 degrees of freedom. This implies that the hypothesis is not rejected at the 5% level thus, low-income males and females do not appear to make the decision to seek treatment in different ways. However, as with the male and female subgroup results above, parameter estimates differ in significance between low-income males and females.

For low-income females only, the coefficient on Race is statistically significant and positive indicating that low-income Native American women are more likely to seek treatment services. Again this result suggests that opportunity costs of information are lower for these women so the probability of treatment seeking is higher.

Being married also has a statistically significant and positive effect on the probability that treatment will be sought for both men and women, which is consistent with the results for the total low-income sample in tables 4 and 5. All else equal, married men and women in low-income households generally perceive the benefits of seeking treatment are higher than the associated opportunity costs.

For low-income females the coefficient on the Care Giver variable is positive and statistically significant at the 10% level indicating that as child care responsibilities increase, all else equal, the probability of seeking treatment also rises. These women may perceive treatment services as a way to increase the quality of in-home care they can provide to their families, therefore treatment benefits are high in comparison to the opportunity costs of being separated from their children during treatment.

The coefficient for the Employed variable is negative and statistically significant for both low-income males and females. Although the coefficient is larger for males, both genders view the opportunity costs of seeking treatment to be high in comparison to the perceived benefits.

Income is a negative and statistically significant indicator of treatment seeking only for low-income women. As income levels rise, all else equal, low-income women are less likely to seek treatment. This result indicates that the opportunity costs of treatment outweigh the perceived benefits for these women.

Having a high school or graduate degree has a statistically significant and positive effect on willingness to seek treatment only for low-income men. The coefficient associated with those men having some college education, although positive, is not significant while men with high school diplomas are slightly more likely to seek treatment than those men with graduate degrees.

Interestingly, the coefficients for the pressure variables are not statistically significant for the low-income male and female subgroups even though the employer pressure variable is positive and significant at the 5% level for the total low-income sample. It appears that

pressure from close relationships has no effect on the willingness of low-income males and females to seek treatment, and consequently, no influence on the perception of the costs and benefits of treatment services.

#### High-Income Males and High-Income Females

In table 8, Model 1 was estimated for both high-income males and females as well as the total high-income sample. The Likelihood Ratio test statistic to test the hypothesis that the treatment seeking decision is identical for each subgroup is estimated to be 19.38 with 15 degrees of freedom. This implies that the hypothesis is not rejected at the 5% level thus, high-income males and females also do not appear to make the decision to seek treatment in different ways. However, as with the male and female and low-income male and female subgroups above, parameter estimates differ in significance between high-income males and females.

The coefficients on Age, Age Squared, and Race are not statistically significant for either males or females. Being married is also not a statistically significant indicator of treatment seeking which is in direct contrast to the low-income males and females for which the coefficients were positive and statistically significant.

Surprisingly, being a full time care giver to children is statistically significant and positive for high-income men only even though 44.5% of high-income women care for an average of 2.14 children full time. This result indicates that for high-income women, while the benefits of seeking treatment may be large, as previously discussed, the opportunity costs of receiving treatment outweigh these benefits sufficiently so that treatment is not sought.

For men this is not the case. As child care responsibilities rise, so does the probability that the high-income man will seek treatment. This result may suggest high-income women value time spent with family more than high-income men and therefore choose not to seek treatment services. On the other hand, high-income men may perceive treatment as a way to protect the family from a breach of provider duties if treatment is not sought.

Being employed and varying levels of income appear to not have an statistically significant effect on the decision to seek treatment for either high-income males or females. All else equal, opportunity costs must be sufficiently high to discourage treatment seeking for employed individuals in this subgroup.

Although Grossman (1997) argued that those with higher levels of education are more efficient producers of utility and therefore require smaller amounts of health care inputs, from the following results it appears that the effects of differing income levels may be more complicated. For high-income men, having some college education decreases the probability that treatment will be sought, and as education advances to baccalaureate and graduate degrees, the probability of not seeking treatment increases. These results are in direct contrast to low-income men with similar educational backgrounds who are more likely to seek treatment services. Educational status does not appear to effect the treatment decision in high-income females which is consistent with the result for low-income females.

Finally, the pressure from friends about substance use has a positive and statistically significant effect on the willingness of high-income males only while pressure from employers increases the probability that treatment will be sought only in high-income females. Again the pressures from family, physicians, and clergy members appear to have no influence on the

treatment decision for either high-income males or females hence they have no apparent effect on the perception of the costs and benefits of treatment services.

### Employed and Unemployed Individuals

Model 1 was estimated for both employed and unemployed individuals as well as the total adult sample with results reported in table 9. The hypothesis that the treatment seeking decision is identical for each subgroup is tested with a Likelihood Ratio test statistic and is estimated to be 10.02 with 15 degrees of freedom. This implies that the hypothesis is not rejected at the 5% level thus, employment status does not appear to alter the decision to seek treatment for individuals. However, parameter estimates for each sample do display differences in statistical significance.

The variables Age, Age Squared, and Race do not have a statistically significant effect on the decision to seek treatment for the employed or the unemployed although gender has a positive and statistically significant effect on the decision for those employed. This result indicates that, *ceteris paribus*, employed males are more likely to seek treatment services and must perceive the benefits to treatment to be higher than the opportunity costs of receiving that treatment.

Being married increases the probability of treatment seeking only for unemployed individuals. For the unemployed who have low opportunity costs of time and no income streams to protect, the perceived benefits to treatment are considerably higher than the opportunity costs of seeking treatment. The effects of child care do not appear to be a

statistically significant influence on the decision to seek treatment services for either subgroup.

Variation in income levels has a negative and statistically significant influence on the decision to seek treatment services only for unemployed individuals. As income increases, presumably because a job is acquired, all else equal, the opportunity costs of treatment seeking increases sufficiently so the probability that treatment is sought decreases.

The education variables are generally statistically insignificant with the exception of some college education, which is statistically significant and negative for the employed population.

Pressure from friends has a positive and statistically significant effect on the probability that treatment will be sought for the employed only while employer pressure has a statistically significant and positive effect on both the employed and the unemployed. For the unemployed group, if the reason for unemployment is due to substance use on the job, then pressure from prior employers about substance use could increase the benefit to treatment seeking if the possibility of new employment exists. Again the pressures from family, physicians, and clergy members have no statistically significant effect on the treatment decision for the employed or the unemployed.

#### Summary of Major Empirical Findings

The above results provide new and interesting insights into the decision to seek substance abuse treatment services. Many empirical studies regarding the treatment decision have not studied specific treatment populations in comparison with other non-treatment

populations. The present study analyzes the treatment seeking decision for a population of individuals with a diagnosed need for these services regardless of whether or not treatment services are currently being sought by these individuals. Within this population, certain subgroups of individuals were analyzed in comparison to the total population and other subgroups within the total population. Although Likelihood Ratio tests did not reject the hypotheses that the treatment decision was identical for these subgroup members, the empirical results do offer new insight into particular variables that influence the treatment decision among members of the subgroups studied.

George, et al. (1996), Hasin (1994), Carroll and Rounsaville (1992), Krampen (1989), Miller (1985), Hingson, et al. (1982), Dahlgren and Myrhed (1977), and Lemere, et al. (1958) all reported that external pressure to individuals regarding their substance use increased the probability of seeking treatment. Preliminary analyses not reported in this thesis confirmed that an aggregate measure of external pressure to an individual about their substance use increased the probability of seeking treatment. However, one of the objectives of the present study was to evaluate the effects of individual sources of external pressure on the decision to seek treatment.

Five sources of pressure were studied, pressure from family, friends, employers, physicians, and clergy members. Pressure from friends and employers regarding substance use increased the probability of treatment seeking for the total adult sample and other subgroups while pressure from family, physicians, and clergy had no apparent effect on the treatment decision for any of the populations studied.

The statistically insignificant result for the family pressure variable is interesting since it was present most frequently across all subgroups in the sample (refer to table 3). It appears that even though family members oppose substance use and create external pressure on the individual to seek treatment, this pressure has no influence on the substance using individual when making the decision to seek treatment services, hence family members have no influence on the perception of the benefits and costs of treatment seeking for the individuals in this study. However, it should be noted that being married may proxy for family pressure and was shown to be a positive and significant influence on the treatment decision for low-income individuals, females, low-income males and females, and the unemployed.

That pressure from physicians and clergy members appears to have no effect on the treatment decision is also interesting, implying that individuals do not appear to be influenced by their doctors or spiritual advisors when deciding to seek treatment. This may indicate physicians and clergy members are not able to effect the substance user's perception of the benefits and costs of treatment services. However, pressure from these sources may be represented by the Married variable if spouses are informed of the need for treatment services and can effect the treatment decision of their partners.

Within the subgroups studied, the effect of individual sources of external pressure on the decision to seek treatment was evident. Individuals with high-incomes, males, high-income males, and employed individuals were more likely to seek treatment when friends pressured these individuals about their substance use. On the other hand, pressure from employers increased the willingness for treatment in low-income individuals, females, high-income females, and both the employed and unemployed. From these results it is apparent

that when different sources of external pressure are considered, income levels, gender, and employment status play an important role in the perception of the benefits and costs of treatment services.

For the low-income sample as a whole, pressure from employers was positive and statistically significant. However, for the low-income male and female subgroups, none of the external sources of pressure were statistically significant influences on the treatment decision. This suggests that gender may play a role in the treatment decision for low-income households even though Likelihood Ratio testing could not reject the hypothesis that the treatment decision was different between low-income males and females.

Employers who pressure employees regarding their substance use have a positive and statistically significant effect on the treatment decision for the total adult sample, low-income individuals, females, high-income females, and both the employed and unemployed. What is interesting about this result is that employer pressure was the least frequent source of external pressure to be reported in all subgroups (refer to table 3). These findings indicate that pressure from employers about substance use has an important positive effect on the probability of treatment seeking, and that this effect is largest for the female categories. This suggests that for females with current treatment needs, pressure from employers is an important influence on the perception of the benefits and costs of seeking treatment services.

Another interesting and related result is the effect employment status has on the treatment decision. For the total adult sample, being employed decreases the probability that treatment is sought, however, pressure from employers increases the probability of treatment seeking. These results are repeated for the low-income and females subgroups. For these

individuals the opportunity costs of treatment are mitigated when employers pressure employees about their substance use, presumably with the threat of job loss if treatment is not sought.

Employment status is also negative and statistically significant for males, and for low-income males and females which is in direct contrast to high-income males and females who apparently are not influenced by employment status when deciding to seek treatment services. Males however are more likely to seek treatment when friends pressure them about their substance use. This suggests that the perception of treatment seeking costs for employed males is mitigated by close friendships.

Income level is statistically significant and negative for low-income individuals, low-income females, and the unemployed implying that as incomes rise the probability of seeking treatment decreases. For these subgroups apparently the opportunity costs of seeking treatment outweigh the perceived benefits when incomes rise. It is interesting to note that the Income coefficient estimate for unemployed individuals, while negative and significant, is close to zero in value. This suggests, *ceteris paribus*, that when incomes rise for unemployed individuals, the perceived benefits of treatment are very close in value to the perceived costs, indicating that the probability of seeking treatment decreases only slightly for this subgroup.

Educational status also provided interesting results when employment, gender, and income levels were considered. For the low-income subgroup the coefficient estimates for the education variables were generally significant and positive while for the high-income group they were generally significant and negative. These results also hold for low and high-income men; low-income men are more likely to seek treatment as education levels rise while

high-income men are less likely to seek treatment for similar changes in educational status. Low and high-income females do not appear to be influenced by educational levels when making the treatment decision. Grossman (1997) argued that higher educational levels would require lower levels of health inputs [treatment] to maximize utility. It is clear from these results that the effects of gender and income on health service inputs [treatment services] are more complicated than Grossman had originally proposed:

Marital status and child care responsibilities also yield interesting results. Previous research does not address the issues of income, employment status, or child care on the decision to seek treatment for married men and women. In this study, being married has a positive and statistically significant effect on treatment seeking for low-income individuals, females, low-income males and females, and the unemployed. Clearly the benefits of seeking treatment are substantially greater than the opportunity costs for married individuals in these subgroups.

Primary child care giving is also positive and statistically significant but only for low-income females and high-income males. The latter result is interesting in that 44.5% of high-income females are primary care givers yet child care responsibilities are not a significant indicator for treatment seeking. As previously discussed, the opportunity costs of being separated from families while receiving treatment services is substantial enough to mitigate treatment seeking in high-income females while for high-income men, who may perceive treatment seeking as a way to continue providing for the family if job loss is prevented, the benefits outweigh the costs.

Finally, while Kaskutas, et al. (1997) reported men to be more likely to seek treatment services, the issue of employment status was not addressed. In this study the effects of gender on the probability of seeking treatment were positive and statistically significant only for employed individuals indicating that employed males were more likely to seek treatment. However, even though Likelihood Ratio testing could not reject the hypothesis that the decision to seek treatment was identical for men and women, it is apparent from the results in this study that gender has some effect on the decision for treatment within male and female subgroups.

The results of this study provide new and interesting insights into the decision to seek treatment services for those individuals with a current diagnosed need for treatment. The population and subgroups studied provide new information on some possible influences on the decision to seek treatment services. The reported findings on the external pressure to individuals about their substance use, employment status, income levels, educational status, marital and primary child care responsibilities, and gender issues confirm that these variables have a statistically significant influence on the substance user's decision to seek treatment services. The final chapter of this study discusses the possible policy implications for these results and offers ideas for further research on this topic.

## CHAPTER 7

### CONCLUSION

The objective of this thesis has been to assess the potential effects of several economic and socio-demographic variables and four individual external pressure variables on the decision to seek substance abuse treatment services. A benefit/cost framework has been utilized to analyze the decision to seek substance abuse treatment services in terms of the perceptions of the benefits and costs of seeking treatment. It has been argued that treatment services will be sought when the present value of the expected future stream of benefits from treatment are greater than the present value of its expected future costs. It has also been argued that events that either raise the expected benefits or lower the expected costs of seeking treatment increase the probability that these services will be sought. It is these events and their influence on the decision to seek treatment services that have been of primary interest in this thesis.

Treatment seeking behavior of individuals diagnosed as substance abusers has been examined for the total adult population. In addition, five pairs of population subgroups are considered: low and high-income individuals, men and women, low-income men and women, high-income men and women, and the employed and unemployed. Further division of the population into more finely delineated subgroups, for example employed low-income males

and females, was not possible because sample sizes became too small for reliable results to be obtained from statistical analyses.

The data were drawn from a telephone survey of non-institutionalized adults residing in the state of Montana and the rural communities of Colorado. The survey was designed to estimate the prevalence of alcohol and drug abuse within these communities and to assess the treatment demand for publicly sponsored substance abuse programs. The population utilized in this study consisted of individuals with a diagnosed current need for treatment services. The reliability of this data therefore depends on the substance abuse and dependency diagnoses determined by a computer algorithm implementing the Diagnostic and Statistical Manual of Mental Disorders, Vol.3 (DSM III-R) and the American Society of Addiction Medicine (ASAM) Patient Placement criterion. While the DSM III-R criterion have been shown to accurately diagnose substance abuse disorders 80% of the time (Aktan, et al. (1997)), inherent difficulties in using the DSM III-R as a diagnostic tool exist. The additional limitation of self report inventories regarding substance use complicates the ability to accurately diagnose substance use disorders.

Multinomial logistic (logit) regression models were used to estimate the willingness to seek substance abuse treatment services as a function of twelve economic and socio-demographic variables and four external pressure variables for the total adult sample and for each of the five pairs of subgroups. A second model that includes an individual's history of prior treatment episodes but excludes the four pressure variables was estimated only for the total adult sample and the low and high-income subgroups. Although Likelihood Ratio tests did not reject the hypotheses that the treatment seeking decision is identical for each subgroup

analyzed, the results obtained nevertheless provide new and interesting insights into the decision to seek substance abuse treatment services among members of the subgroups studied. These insights are important because often public policies are targeted toward some of the population subgroups examined in this study. For example, Medicaid programs at the state level provide resources for substance abuse treatment for individuals from low-income households and other programs are targeted toward women of child bearing age.

Pressure from friends regarding substance use increased the probability of treatment seeking for individuals within the total sample, individuals with high-incomes, males, high-income males, and the employed. Pressure from employers regarding substance use increased the probability of treatment seeking for the total sample, low-income individuals, females, high-income females, and both the employed and the unemployed. Being married, a possible proxy for family pressure, increased the probability of treatment seeking for low-income individuals, females, low-income males and females, and the unemployed. These results suggest that individuals who maintain close influential relationships with substance users, and particularly employers, could be targeted with new or existing programs to educate them in assisting the substance using individual's decision to seek treatment.

Surprisingly, individuals do not appear to be influenced by their physicians or clergy members when deciding to seek substance abuse treatment services within the total adult sample or any of the subgroups analyzed. A study conducted by the National Center on Addiction and Substance Abuse at Columbia University found 74.1 percent of patients surveyed stated their primary care physician was not involved in their decision to seek treatment, and 16.7 percent said their physician was involved only "a little" (CASA (2000)).

These results may indicate physicians are not able to affect the substance user's perception of the benefits and costs of treatment services with the current methods utilized to influence patients to seek health services. However, as previously discussed, the impact of pressure from physicians may be represented by the Married variable.

Of more concern are the following statistics also reported by the CASA (2000) study. Only one in five (19.9 percent) primary care physicians considered themselves "very prepared" to identify alcoholism, 16.9 percent considered themselves "very prepared" to identify illegal drug use, and 30.2 percent considered themselves "very prepared" to identify prescription drug use. It was also reported that 29.5 percent of patients stated their physician continued to prescribe psychoactive drugs such as sedatives and Valium even when the physician was aware of the patient's addiction. Clearly continuing education regarding the substance abuse process, procedures used to identify substance abuse, principles of substance abuse treatment services, and continuing care of the addicted patient should be required of all treating physicians in order to prevent further medical contribution to the progression of substance abuse in their patients.

Marital status and child care responsibilities also yield interesting results. Previous research does not address the issues of income, employment status, or child care on the decision to seek treatment for married men and women. In this study, being married has a positive and significant effect on treatment seeking for low-income individuals, females, low-income males and females, and the unemployed. Primary child care responsibilities are also positive and significant but only for low-income females and high-income males. The opportunity costs of being separated from families while receiving treatment services appears

to be substantial enough to mitigate treatment seeking for these subgroups. Treatment facilities offering child care and family counseling services may be able to reduce the perceived costs of family separation during the treatment process.

Employment status has a negative and significant effect on the probability of treatment seeking in the total adult sample, low-income individuals, males and females, and low-income males and females while income levels also have a negative and significant effect for low-income individuals, low-income females, and the unemployed. However, as discussed above, pressure from employers regarding substance use has a positive and significant effect on the probability of treatment seeking in certain subgroups of individuals with a diagnosed current need for treatment services. This suggests that employers, through the threat of job loss to the individual or other sanctions, may increase the perceived benefits of treatment seeking in their employees by increasing the opportunity cost of continued substance use, thereby increasing the probability that treatment services are sought.

Employers may also decrease the perceived costs of treatment seeking. It is possible for disability insurance to cover a percentage of lost income for the individual during treatment episodes while employers can enforce drug abstinence policies through regular drug testing, offering a guarantee of employment if a return to substance use is not indicated. Government subsidies for agencies at the state and local levels could also mitigate the costs to employers of these policies by providing substance abuse education information and low cost drug testing.

Educational status also provided interesting results when employment, gender, and income levels were considered. For the low-income subgroup the coefficient estimates for

the education variables were generally significant and positive while for the high-income group they were generally significant and negative. These results also hold for low and high-income men; low-income men are more likely to seek treatment as education levels rise while high-income men are less likely to seek treatment for similar changes in educational status. Low and high-income females do not appear to be influenced by educational levels when making the treatment decision. Grossman (1997) argued that higher educational levels would require lower levels of health inputs [treatment] to maximize utility. It is clear from these results that the effects of gender and income on health service inputs [treatment services] are more complicated than Grossman originally suggested for health services in general.

Finally, while Kaskutas, et al. (1997) reported men to be more likely to seek treatment services, the issue of employment status was not addressed. In this study the effects of gender on the probability of seeking treatment were positive and statistically significant only for employed individuals, indicating that employed males were more likely to seek treatment. While Likelihood Ratio tests did not reject the hypothesis that the decision to seek treatment was identical for men and women, the results presented in this study for the total population indicate that gender has some effect on the decision for treatment within male and female subgroups.

An important limitation to the above results needs to be emphasized. The reliability of the data utilized in this study depends on the substance abuse and dependency diagnoses determined by the Diagnostic and Statistical Manual of Mental Disorders, Vol.3 and the American Society of Addiction Medicine Patient Placement criterion. The additional limitation of the use of self report inventories complicates the ability to accurately diagnose

these substance use disorders. As the diagnostic ability of professionals, and the related survey instruments, become more sophisticated, future research may indeed provide more accurate information regarding the perceptions of the benefits and costs of substance abuse treatment services.

Another important limitation is the sample sizes available for this study. It was not possible to divide the subgroup populations further into unemployed, low-income, females for example as the reduced sample sizes prevented accurate statistical analyses to be performed. It is important to understand the treatment seeking decision for individuals within these subgroups so substance abuse treatment policies can be targeted to the most effective populations. Future studies may focus on larger data sets such as the National Household Survey on Drug Abuse which employs a survey instrument similar to the one employed for the data set in this study.

The results of this study provide new and interesting insights into the decision to seek treatment services for those individuals with a current diagnosed need for treatment. The reported findings on the external pressure to individuals about their substance use, employment status, income levels, educational status, marital and primary child care responsibilities, and gender issues confirm that these variables have a significant influence on the substance user's decision to seek treatment services. If the factors that influence the perception of the benefits and costs associated with seeking treatment for substance abuse, which in turn influences the demand for these services, were better understood then it is hoped that effective resource allocation for treatment services may be possible in both the private and public sectors.

## BIBLIOGRAPHY

- Ainslie, G. (1975). Specious Reward: A Behavioral Theory of Impulsiveness and Impulse Control. *Psychological Bulletin*, v82: 463-509.
- , (1982). A Behavioral Economic Approach to the Defense Mechanisms: Freud's Energy Theory Revisited. *Social Science Information*, v21: 735-779.
- , (1986). Beyond Microeconomics: Conflict Among Interests in a Multiple Self as a Determinant of Value. In Elster, J. (ed.). *The Multiple Self*. Cambridge, UK: Cambridge University Press.
- , (1992). *Picoeconomics*. Cambridge, MA: Cambridge University Press.
- Akerlof, G. (1991). Procrastination and Obedience. *American Economic Review*, v81, n2: 1-19.
- Armor, D.J., Polich, H.B., and Stambul, H.B. (1978). *Alcoholism and Treatment*. John Wiley & Sons, New York, NY.
- Badiet, P. (1976). Women and Legal Drugs. In McLennan A., Pinder L. (eds.): *Women: Their Use of Alcohol and Other Legal Drugs. A Provincial Consultation*. Toronto, Addiction Research Foundation: 57-81.
- Becker, G. (1964). *Human Capital*. National Bureau of Economic Research. New York: Columbia University Press.
- , (1965). A Theory of the Allocation of Time. *Economic Journal*, v75: 493-517.
- , (1967). *Human Capital and the Personal Distribution of Income: An Analytical Approach*. Ann Arbor, Michigan: University of Michigan.
- , (1987). "Economic Analysis and Human Behavior", chapter 1, *Advances in Behavioral Economics*, Vol. 1. New Jersey: Ablex Publishing Corp.

- , Grossman, M. and Murphy, K. (1991). Rational Addiction and the Effect of Price on Consumption. *American Economic Review*, v81, n2: 237-241.
- , Grossman, M. and Murphy, K. (1994). An Empirical Analysis of Cigarette Addiction. *American Economic Review*, v84, n3: 396-418.
- , and Murphy, K. (1988). A Theory of Rational Addiction. *Journal of Political Economy*, v96, i4:675-700.
- Beckman, L. (1975). Women Alcoholics: A Review of Social and Psychological Studies. *Journal of Studies on Alcohol*, v36: 797-825.
- Beckman, L., and Amaro, H. (1986). Personal and Social Difficulties Faced by Women and Men Entering Alcoholism Treatment. *Journal of Studies on Alcohol*, v47 (2): 135-145.
- Bell, D. C., Montoya, I.D., Richard, A. J., and Dayton, C. A. (1998). The Motivation for Drug Abuse Treatment: Testing Cognitive and 12-Step Theories. *American Journal of Drug and Alcohol Abuse*, v24: 551.
- Ben-Porath, Y. (1967). The Production of Human Capital and the Life Cycle of Earnings. *Journal of Political Economy*, v75: 353-367.
- Bentzen, J., Eriksson, T., and Smith, V. (1999). Rational Addiction and Alcohol Consumption: Evidence from the Nordic Countries. *Journal of Consumer Policy*, v22, n3: 257-279.
- Bretteville-Jensen, A. (1999). Addiction and Discounting. *Journal of Health Economics*, v18:393-407.
- Cameron, S. (2000). Nicotine Addiction and Cigarette Consumption: A Psycho-Economic Model. *Journal of Economic Behavior and Organization*, v41, n3: 211-219.
- Carroll, K. M., and Rounsaville, B. J. (1992). Contrast of Treatment-Seeking and Untreated Cocaine Abusers. *Archives of General Psychiatry* v49: 464-471.
- Chaloupka, F. (1988). An Economic Analysis of Addictive Behavior: The Case of Cigarette Smoking. Ph. D. Dissertation, City University of New York, New York.
- , (1990). Men, Women, and Addiction: The Case of Cigarette Smoking. National Bureau of Economic Research Working Paper No. 3267, Cambridge, Massachusetts.

- , (1991). Rational Addictive Behavior and Cigarette Smoking. *Journal of Political Economy*, v99, n4: 722-742.
- , Grossman, M., Becker, G., and Murphy, M. (1993). Alcohol Addiction: An Econometric Analysis. Anaheim, CA: Presented at the Annual Meeting of the American Economic Association.
- Dahlgren, L., and Myrhed, M. (1977). Female Alcoholics: Ways of Admissions of the Alcoholic Patient. A Study with Special Reference to the Alcoholic Female. *Acta Psychiatrica Scandinavica*, v56: 39-49.
- Davis, R. D. (1997). Women Healing From Alcoholism: A Qualitative Study. *Contemporary Drug Problems*, v24: 147-177.
- Elster, J. (1984). Ulysses and the Sirens. Cambridge, UK: Cambridge University Press.
- Erbslund, M., Reid, W., and Ulrich, V. (1995). Health, Health Care, and the Environment: Econometric Evidence from German Micro Data. *Health Economics*, v4: 169-182.
- Fehr, E. and Zych, P. (1998). Do Addicts Behave Rationally? *Scandinavian Journal of Economics*, v100, n3: 643-662.
- Festinger, L. (1957). A Theory of Cognitive Dissonance. Stanford, CA: University Press.
- Fortney, J. C., Booth, B. M., Blow, F. C., and Bunn, J. Y., Loveland-Cook, C. A. (1995). The Effects of Travel Barriers and Age on the Utilization of Alcoholism Treatment Aftercare. *American Journal of Drug and Alcohol Abuse*, v21: 391-407.
- Frank, B. (1996). The Use of Internal Games: The Case of Addiction. *Journal of Economic Psychology*, v17: 651-660.
- Furst, C. Beckman, L., and Nakamura, C. (1981). Utilization of Alcohol Treatment Services in California. University of California, Alcohol Research Center, Neuropsychiatric Institute Los Angeles, California
- George, A. and Tucker, J. (1996). Help-Seeking for Alcohol-Related Problems: Social Contexts Surrounding Entry into Alcoholism Treatment or Alcoholics Anonymous. *Journal of Studies on Alcohol*, v57, n4: 449-458.
- Gerdtham, U., and Johannesson, M. (1999). New Estimates of the Demand for Health: Results Based on a Categorical Health Measure and Swedish Micro Data. *Social Science & Medicine*, v 49: 1325-1332.

- Gerdtham, U., Johannesson, M., Lundberg, L., and Isacson, D. (1999). The Demand for Health: Results From New Measures of Health Capital. *European Journal of Political Economy*, v15: 501-521.
- Goldbaum, D. (2000). Life Cycle Consumption of a Harmful and Addictive Good. *Economic Inquiry*, v38, n3: 458-469.
- Greene, W. (2000). *Econometric Analysis*, 4<sup>th</sup> ed. New Jersey: Prentice Hall.
- Grossman, M. (1972). The Demand of Health: A Theoretical and Empirical Investigation. National Bureau of Economic Research Occasional Paper No. 119, Columbia University Press, New York, NY.
- , (1997). The Human Capital Model of the Demand for Health. In Newhouse, J. and Culyer, A. (ed.), *Handbook of Health Economics*. Amsterdam, North-Holland.
- , Chaloupka (1998). The Demand for Cocaine by Young Adults: A Rational Addiction Approach. *Journal of Health Economics*, v17, n4: 427-474.
- , and Sirtalan, I. (1998). An Empirical Analysis of Alcohol Addiction: Results From the Monitoring the Future Panels. *Economic Inquiry*, v36, n1: 39-48.
- Hasin, D. S. (1994). Treatment/Self-help for Alcohol-Related Problems: Relationship to Social Pressure and Alcohol Dependence. *Journal of Studies on Alcohol* v55: 660-667.
- Herd, D. (1984). A Review of Drinking Patterns and Alcohol Problems Among U.S. Blacks. Alcohol Research Group, Berkeley.
- , (1986). The Epidemiology of Drinking Patterns and Alcohol Related Problems Among U.S. Blacks. NIAAA Monograph: The Epidemiology of Alcohol Use and Abuse Among U.S. Minorities. Rockville, Maryland: National Institute of Alcohol Abuse and Alcoholism.
- Herrnstein, R., Loewenstein, G., Prelec, D., and Vaughan, Jr., W. (1993). Utility Maximization and Melioration: Internalities in Individual Choice. *Journal of Behavioral Decision Making*, v6: 149-185.
- Herrnstein, R. and Prelec, D. (1991). Melioration: A Theory of Distributed Choice. *Journal of Economic Perspectives*, v5: 319-340.

- Herrnstein, R., Prelec, D., and Vaughan, Jr., W. (1986). An Intra-Personal Prisoners' Dilemma. Paper presented at the IX Symposium on the Quantitative Analysis of Behavior, Harvard University.
- Herrnstein, R. and Vaughan, Jr., W. (1980). Melioration and Behavioral Allocation. In Staddon, J. (ed.). *Limits to Action: The Allocation of Individual Behavior*. New York: Academic Press: 143-176.
- , (1987). Stability, Melioration, and Natural Selection. In Green, L. and Kagel J. (eds.), *Advances in Behavioral Economics*, Vol 1. Ablex.
- Heyman, G. and Herrnstein, R. (1986). More on Concurrent Interval-Ratio Schedules: A Replication and Review. *Journal of the Experimental Analysis of Behavior*, v46: 331-351.
- Hingson, R., Scotch, N., and Day, N. (1980). Recognizing and Seeking Help for Drinking Problems. *Journal Studies on Alcohol*, v41: 1102-1117.
- Hoffman, H (1974). County Characteristics and Admission to a State Hospital for Treatment of Alcoholism and Psychiatric Disorders. *Psychological Reports*, v35: 1275-1277.
- Iannaccone, L. (1984). Consumption Capital and Habit Formation with an Application to Religious Participation. Ph.D. Dissertation, University of Chicago.
- , (1986). Addiction and Satiation. *Economic Letters*, v21, n1: 95-99.
- Kaskutas, L. A., Weisner, C., and Caetano, R. (1997). Predictors of Help-Seeking Among a Longitudinal Sample of the General Population. *Journal of Studies on Alcohol*, v58: 155-162.
- Keeler, T., Hu, T., Barnett, P., and Manning, W. (1993). Taxation, Regulation, and Addiction: A Demand Function for Cigarettes Based on Time-Series Evidence. *Journal of Health Economics*, v12: 1-18.
- Kleyn, J. and Lake, E. (1990). Factors Associated with Willingness to Enter Drug Treatment: Some Implications for Policy. *AIDS & Public Policy Journal*, v5: 112-116.
- Kraft, M. (1993). Help-Seeking Among Intravenous Drug Users: A Multivariate Analysis. Ph.D. Dissertation, BRYN MAWR College, Graduate School of Social Work and Social Research.

- Krampen, G. (1989). Motivation in the Treatment of Alcoholism. *Addictive Behavior*, v14: 197-200.
- Labeaga, J. (1999). A Double-Hurdle Rational Addiction Model with Heterogeneity: Estimating the Demand for Tobacco. *Journal of Econometrics*, v 93, n 1: 49-72.
- Lemere, F., O'Hallaren, P., and Maxwell, M. (1958). Motivation in the Treatment of Alcoholism. *Quarterly Journal Studies on Alcohol*, v19: 428-431.
- Lindbeck, V. L. (1972). The Woman Alcoholic: A Review of the Literature. *International Journal of Addiction*, v7: 567-580.
- McAuliffe, W., LaBrie, R., Mulvaney, N., Shaffer, H., Geller, S., Fournier, E., Eliot, L., Wang, Q., Wortman, S., and Miller, K. (1994). Assessment of Substance Dependence Treatment Needs: A Telephone Survey Manual and Questionnaire, Revised Edition. National Technical Center for Substance Abuse Needs Assessment, Cambridge, Massachusetts.
- Messer, K., Andersen-Clark, K., and Martin, S. L. (1996). Characteristics Associated with Pregnant Women's Utilization of Substance Abuse Treatment Services. *American Journal of Drug and Alcohol Abuse*, v22: 403-423.
- Michael, R. and Becker, G. (1973). On the New Theory of Consumer Behavior. *Swedish Economic Journal*, v75: 378-396.
- Miller, W. R. (1985). Motivation for Treatment: A Review With Special Emphasis on Alcoholism. *Psychological Bulletin*, v98: 84-107.
- Mincer, J. (1974). *Schooling, Experience, and Earnings*. National Bureau of Economic Research. New York: Columbia University Press.
- Mobilia, P. (1990). *An Economic Analysis of Addictive Behavior: The Case of Gambling*. Unpublished Ph. D. Dissertation, City University of New York, New York.
- Morey, L.C., McAuliffe, W. F., and Miller, K. (1995). Estimating Statewide Treatment Mix, National Technical Center Bulletin.
- National Center on Addiction and Substance Abuse (CASA) (2000). *Missed Opportunity: National Survey of Primary Care Physicians and Patients on Substance Abuse, April 2000*, Columbia University.

- National Institute on Alcohol Abuse and Alcoholism (NIAAA) (1988). Women and Alcohol Use: A Review of the Research Literature. U.S. Dept. of Health and Human Services No. ADM 88-1574.
- National Institute of Health (NIH) (1998). NIH News release, "Economic Costs of Alcohol and Drug Abuse Estimated at \$246 Billion in the U.S.", May 13, 1998.
- Nocera, S., and Zweifel, P. (1998). The Demand for Health: An Empirical Test of the Grossman Model Using Panel Data. In Zweifel, P. (ed.), *Health, the Medical Profession and Regulation*: 35. Dordrecht: Kluwer Academic Publishers.
- Olekalns, N. and Bardsley, P. (1996). Rational Addiction to Caffeine: An Analysis of Coffee Consumption. *Journal of Political Economy*, v104, n5: 1100-1104.
- Orphanides, A. and Zervos, D. (1995). Rational Addiction With Learning and Regret. *Journal of Political Economy*, v103, n4: 739-758.
- Orphanides, A. and Zervos, D. (1998). Myopia and Addictive Behavior. *The Economic Journal*, v108: 75-91.
- Paine, H. (1977). Attitudes and Patterns of Alcohol Use Among Mexican Americans: Implications for Service Delivery. *Journal Studies on Alcohol*, v38: 544-553.
- Richman, A., and Smart, R. G. (1981). After how many detoxications is rehabilitation possible? *Drug and Alcohol Dependence*, v7: 233-238.
- Riley, W., Haynes, G., and Smith, V. (1997). Montana Adult Household Substance Abuse Treatment Analysis. Technical Report, Montana Department of Public Health and Human Services, Addictive and Mental Disorders Division, Helena, Montana.
- Robinson, S.D. (1984). Women and Alcohol Abuse-Factors Involved in Successful Interventions. *International Journal of Addiction*, v19: 601-611.
- Rounsaville, B. J., Kleber, H. D. (1985). Untreated Opiate Addicts: How Do They Differ From Those Seeking Treatment? *Archives of General Psychiatry*, v42: 1072-1077.
- Schelling, T. (1980). The Intimate Contest for Self-Command. *The Public Interest*, v60: 94-118.
- Skog, O. (1997). The Strength of Weak Will. *Rationality and Society*, v6, i2: 245-269.
- Stigler, G., and Becker, G. (1977). De Gustibus Non Est Disputandum. *American Economic Review*, v 67: 75-90.

- Steinberg, M.L., Epstein, E. E., McCrady, B. S., and Hirsch, L. S. (1997). Sources of Motivation in a Couples Treatment Program. *American Journal of Drug and Alcohol Abuse*, v23: 191-206.
- Stokes, E.J. (1977). *Alcoholic Women in Treatment: Factors Associated with Patterns of Help-Seeking*. Ph. D. Dissertation, Brandeis University, The Florence Heller Graduate School for Advanced Studies in Social Welfare Waltham, MA
- Thaler, R. and Shefrin, H. (1981). An Economic Theory of Self-Control. *Journal of Political Economy*, v89: 392-410.
- Tellez, L., Rimrock Foundation, Billings, Montana. Phone interview, September 8, 2000.
- Torrance, G. (1986). Measurement of Health State Utilities for Economic Appraisal: A Review. *Journal of Health Economics*, v5: 1-30.
- Towle, L. (1974). Alcoholism Treatment Outcomes in Different Populations. In Chafetz, M. (ed.) *Research Treatment and Prevention: Proceedings of the Fourth Annual Alcoholism Conference of the National Institute on Alcohol Abuse and Alcoholism*. Washington, NIAAA.
- van Doorslaer, E. (1987). Health, Knowledge, and the Demand for Medical Care. Van Gorcum, Asses, Maastricht.
- Varney, S. M., Rohsenow, D. J., Dey, A. N., Myers, M. G., Zwick, W. R., and Monti, P. M. (1995). Factors Associated With Help-Seeking and Perceived Dependence Among Cocaine Users. *American Journal of Drug and Alcohol Abuse*, v21: 81-92.
- Wagstaff, A. (1986). The Demand for Health: Some New Empirical Evidence. *Journal of Health Economics*, v5: 195-233.
- Wagstaff, A. (1993). The Demand for Health: An Empirical Reformulation of the Grossman Model. *Health Economics*, v2: 189-198.
- Waters, T., Sloan, F. (1995). Why Do People Drink? Tests of the Rational Addiction Model. *Applied Economics*, v27: 727-736.
- Weisner, C. (1984). The Changing Alcohol Treatment System: A Profile of Clients. Paper presented at Meeting of International Group for Comparative Alcohol Studies, Stockholm, Sweden: 23-27.

- , (1987). The Social Ecology of Alcohol Treatment in the United States. In Galanter, M., Begleiter, H., et al (eds.), *Recent Developments in Alcoholism*, Vol 5. New York, NY: Plenum Press: 203-244.
- , (1990). The Alcohol Treatment-Seeking Process From a Problems Perspective: Responses to Events. *British Journal of Addiction*, v85: 561-569.
- Winston, G. (1980). Addiction and Backsliding. *Journal of Economic Behavior and Organization*, v1: 295-324.
- Yih-Ing, H., Maglione, M., Polinsky, M., and Anglin, M. (1997). Predicting Drug Treatment Entry Among Treatment Seeking Individuals. *Journal of Substance Abuse Treatment*, v15: 213-220.
- Zule, W. A., Desmond, D. P., and Vogtsberger, K. N. (1997). Injecting Drug Users Who Want Treatment. *American Journal of Drug and Alcohol Abuse*, v23: 507-523.