

**A LONGITUDINAL STUDY OF
ALCOHOL AND DRUG USE IN THE WORKPLACE**

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ABSTRACT

Alcohol abuse and illicit drug use in the United States are major concerns of American households, as well as of the White House. This dissertation research evaluates alcohol abuse and controlled drug use by American workers in the context of various individual, organizational, and occupational settings. It tests the importation and organizational stress perspectives, the occupation subculture perspective, and the lifecycle wage compensation theory. The analyses are developed utilizing (1) logistic regression, (2) generalized linear modeling, including Poisson regression and negative binomial regression, (3) weighted modeling estimation, taking the clustering effects of complex survey design into account, and (4) the hierarchical growth curve modeling of intra- and inter-individual differences. Using data from the National Longitudinal Survey of Youth 1979–1993, the 1997 National Household Survey on Drug Abuse, and the 1998 National Occupational Information Network (O*NET 98), I find that employees' drinking and controlled drug use behavior are predicted by a number of individual background characteristics, as well as workplace-environment variables. I also find that occupational characteristics influence alcohol and drug using behaviors of workers, although in more complex ways than suggested by much of the organizational stress and occupational subculture literature. It appears that occupations with higher levels of steady employment prospects exert the most significant negative effect on employees' alcohol use, marijuana use, and any illicit drug use, regardless of an

employee's age, gender, race, education, and income. It also appears that the etiology of cocaine use is different from that of either alcohol use or other drugs, such as marijuana. Finally, I find that when education and years employed are held constant, employees' current marijuana use is negatively associated with their earnings. No evidence has been found that current alcohol use, current marijuana use, or lifetime cocaine use predicts future growth rates on earnings. Having examined the factors of occupational, organizational, and individual social/demographic characteristics as they influence patterns of alcohol abuse and controlled drug use in multiple large representative samples of the labor force, discussions on the research findings, the implications, the limitations, and the future study directions are presented.

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CHAPTER I. INTRODUCTION

1.1 Aims of the Dissertation

The purpose of this dissertation research is to evaluate alcohol abuse and controlled drug use by American workers in the context of various individual, organizational, and occupational settings, using the national longitudinal data of youth, the national household data on alcohol and drug use, and the national occupational network information database. Grounded upon a coherent theoretical framework surrounding workplace characteristics, occupational attributes, and labor market effects, a set of empirical testings has been conducted in order to enhance an in-depth understanding of, and provide insight on the etiology and consequences of alcohol abuse and controlled drug use behavior. In addition to investigating the influences of workers' perceived organizational characteristics, the dissertation further explores the full and unique effects of structured occupational characteristics in shaping employees' alcohol use, alcohol abuse, and controlled drug use behavior. In order to uncover the veil brought by inconsistencies of the mixed findings in the previous literature, workers' incomes and their growth as they relate to marijuana, cocaine, and heavy alcohol use and the differences in the growth trajectories are also investigated explicitly through a longitudinal developmental approach.

1.2 Significance of the Study

According to the United States Department of Health & Human Services, the Anti-Drug Abuse Act of 1988 focused national priority and attention on the creation of a drug-free America. Now, ten years later, illegal drugs kill 14,000 people a year in the United States alone with a subsequent cost of \$70 billion. Drugs still exact a tremendous toll on this Nation in that substance abuse fuels abusive relationships, crime (property and violent), accident, absenteeism, and the spread of AIDS and other sexually transmitted diseases. As President William Jefferson Clinton conveyed in his 1999 transmittal letter to the U. S. Congress: "In a 10-year period, over 100,000 Americans will die from drug use. The social costs of drug use continue to climb, reaching \$110 billion in 1995, a 64 percent increase since 1990. Much of the economic burden of drug abuse falls on those who do not abuse drugs -- American families and their communities. Although we have made progress, much remains to be done" (Clinton, 1999).

Research on alcohol and drug use is a huge enterprise since the research subject is a major concern of the White House, as well as of American households. The problems of drinking and illicit use of drugs have drawn concerns from individuals, employers, government agencies, and health care providers and has also brought an appreciable amount of liability to a variety of stakeholders. It is important to study workers' alcohol abuse and drug use because it is ubiquitous in contemporary America and excessive use may be associated with dysfunctional consequences. For some workers, drugs may be preferred to alcohol because it may be easier to conceal such use while on the job.

1.2.1 On Alcohol

Persistent heavy drinking can lead to a range of social, psychological and medical problems, including dependence, and is associated with impaired work performance and absenteeism (Trice & Roman, 1972). Given that we are facing an era when global competitiveness and robust stock market valuations are putting ever-increasing pressure on companies to squeeze every ounce of productivity out of their employees, the etiology of employees' alcohol use and controlled substance use needs to be under more systematic investigation.

1.2.2 On Drugs

Drugs are unquestionably a significant social problem for the United States in the 1990s (Gerstein & Green, 1993). Almost two-thirds (64 percent) of the respondents to a 1990 New York Times-CBS poll rated drugs as the nation's number one problem (The New York Times, 1990). More than one-half, or 56 percent, of respondents to a survey conducted by the Harvard School of Public Health in 1997 identified drugs as the most serious problem facing children in the United States (Harvard University, 1997). A recent survey report indicates that 82 percent of those polled called illegal drugs "a big problem for society" (Economist, 1998). The 1994 National Household Survey on Drug Abuse, a large nationally representative survey, found that almost 70 percent of the estimated number of current illicit drug users (use of any illicit drug in the prior month) are employed full-time (Substance Abuse and Mental Health Services Administration [SAMHSA], 1997).

Expenditures by drug users in the United States can be differentiated by the type of drugs used. In 1988, for example, the total U. S. expenditures was 61.2 billions of dollars on cocaine, 17.7 billions of dollars on heroin, and 9.1 billion on marijuana (Abt Associates, Inc. 1997).

It is difficult to overestimate the impact of employees' heavy alcohol and drug use in the workplace. Such use has placed an exorbitant burden on American industry; an Institute of Medicine report estimates a cost to U.S. industry of \$33 billion due to lost productivity associated with substance abuse (Gerstein & Harwood, 1990). Another study estimated the cost of substance abuse to business and industry at around \$20 billion for alcohol and \$16 billion for drugs in the 1980s (Scanlon, 1986).

The nexus of drugs and crime heightens the importance of the issue in the international arena and remains as one of the indispensable topics in bilateral relations involving the American foreign policy, particularly with respect to some adjacent regions (Central and South America). So serious is the problem of substance abuse that the federal government has spent over one billion dollars annually since the early 1980s on drug control, and this amount has increased steadily to over \$11 billion for 1992 (White House Office of National Drug Control Policy, 1991) and \$16 billion for 1998 (White House Office of National Drug Control Policy, 1998).

1.3 The Themes of This Dissertation

This dissertation has three themes:

- Theme 1: The first theme is that social structure gives rise to risk factors associated with alcohol and controlled drug use. In short, social roles generate circumstances which increase the likelihood of alcohol and controlled drug use by today's workers.
- Theme 2: The second theme is that members of occupations and workers share what has been termed an "occupational culture," generated in response to working

conditions, which shapes the way work is done, and affects the behavior of workers both on and off the job.

- Theme 3: Although the problem examined in this dissertation is investigated primarily from a sociological vantage point, problems and issues raised by other disciplines will be addressed as well.

1.4 Background of Alcohol, Marijuana, and Cocaine Use

1.4.1 Current Prevalence Rates¹

1.4.1.1 Alcohol

Alcohol has been reported as the most commonly used psychoactive drug in the United States. In 1996, about 109 million persons (51 percent reported current use (in the prior month), and about 11 million persons (5 percent) reported heavy alcohol use in the prior month (SAMHSA, July 1997).

¹ See Office of Applied Studies, SAMHSA, National Household Survey on Drug Abuse: Population Estimates 1996, DHHS Publication No. (SMA) 97-3137, Rockville, MD: US Department of Health and Human Services (July 1997).

1.4.1.2 Marijuana

Marijuana was the most commonly used illicit drug in 1996; approximately 77 percent of current illicit drug users were marijuana or hashish users. About 18 million (9 percent) reported use in the prior year, and 10 million (5 percent) reported current use (in the prior month) (SAMHSA, 1997).

1.4.1.3 Cocaine

About 4 million (1.9 percent) reported cocaine use in the prior year, and 1.7 million (0.8 percent) reported current use (in the prior month) (SAMHSA, July, 1997).

1.4.2 *Subjective Effects*

The following paragraphs describe the effects of alcohol and selected drugs.

1.4.2.1 Alcohol

Alcohol is an intoxicating drug that can induce both physical addiction and psychological dependency. Depending on many different factors, it can stimulate or depress, make a person euphoric or sleepy, and heighten or reduce anxiety. Olson and Gerstein (1985:9) describe this spectrum with the following language: “a person can be mellow, tipsy, or tight; plastered, soused, or loaded; dead drunk, under the table, or out cold”.

1.4.2.2 Marijuana

The usual effect produced by smoking marijuana (also called cannabis, “grass” or “pot”) is euphoria, an intensification of feelings, and a distorted sense of time and space, all with few unpleasant after-effects (Clinard & Meier, 1995). According to Goode’s description (Goode, 1970; Goode, 1997), an extremely common account of the marijuana experience is “feeling more

relaxed”, “more peaceful”, “happy, silly, euphoric, relaxed, hedonistic, sensual, foolish, and decidedly nonserious” (Goode, 1997:152).

1.4.2.3 Cocaine

Cocaine, as a stimulant, produces a “euphoria, a sense of intense stimulation, and a sense of psychic and physical well-being accompanied by reducing fatigue” (Clinard & Meier, 1995:224). According to Goode (1997:157), the second most frequently described effect by users is “confidence, a sensation of mastery in what one is one does” and the third most commonly reported effect is “a burst of increased energy, the suppression of fatigue, a stimulation of the capacity to continue physical and mental activity more intensely and for a longer than normal period of time.”

1.4.3 Cultural Differences

The differing cultural meanings associated with these substances provide the context of the etiology of their use.

1.4.3.1 Alcohol

Alcohol is a drug, albeit a legal and therefore the most often used. While drinking as a social ritual is quite compatible with societal norms, binge drinking or bouts of intoxication are clearly disapproved in most cases. Excessive drinking can destroy role performance and permanently impair physical and psychological functioning. To be sociable, to reduce anxieties and to avoid depression are reasons that have been cited as why people drink. In many cases, consuming alcohol is an integral element in many adult occupational situations.

1.4.3.2 Marijuana

Marijuana use have changed from a symbol of antiestablishment protest in the early 1970s to less anathema activity to adults today; therefore, the decision to use marijuana is accompanied by a relatively low level of psychological or social anxiety, since its use has become increasingly socially normative, especially within certain age groups. Marijuana use, like alcohol, cuts across socioeconomic lines. Unlike alcohol, however, marijuana typically produces little aggression or violence, tending rather to lead to passivity and mild lethargy (Trice & Roman, 1972).

1.4.3.3 Cocaine

The perception that drugs other than marijuana are more dangerous and more daring to try persists among users and nonusers alike. However, users share a knowledge about drug effects and how to control them that is generally unavailable to the wide public (Kandel & Maloff, 1983). Cocaine was an acceptable drug until the Pure Food and Drug Act of 1906. Since then, users of cocaine have been identified in socially marginal groups as criminals, jazz musicians, prostitutes, and blacks, and apparently recently, in various “professional” groups (e.g., writers and other intellectuals who desired to work long hours used cocaine for its stimulant properties). Cocaine has been characterized at different points in times as the “champagne of the street” and “the rich men’s drug”(Clinard & Meier, 1995). Cocaine has been used by the “jet set,” athletes, and rock stars, and thus has represented money, power, and success (Kandall, 1996). According to Newcomb and Bentler (1990), the antecedents to cocaine are general, rather than specific. The processes that lead to cocaine do not differ from those that lead to heroin or other illicit drug use. This conclusion, however, needs more empirical tests.

1.5 Use, Abuse, and Controlled Use

Throughout this dissertation, the major dimensions of substance use that I am interested in are twofold: alcohol abuse and controlled drug use. The basic commonality of these two behaviors is that both are marginal in the normative system—in sociological terms, the use of these substances is regarded as deviant. Adult alcohol use is part and parcel of American life; thus, focusing only on whether a worker uses alcohol or not would make it difficult to distinguish whether alcohol use is mainly for the so-called sociable purpose or whether it is a habit induced by some other social structural characteristics. Hence, in this dissertation, I consider “heavy drinking” as the indicator of alcohol abuse; the detail measures will be illustrated in the later chapters. I will also examine whether a worker is a current alcohol user, and the frequency with which a worker uses alcohol.

“Controlled drug use” is used to refer to the drug use reported by survey respondents. There are both the over the counter drugs and illicit drugs in the market; the term “drug use” that I use in this dissertation refers to the illegal drug use only. For any illicit drug use, I limit the focus on current (i.e., prior month) drug use, and for more specific drug use, such as marijuana and cocaine, I limit the timeframe to use in the prior year. Researchers on drug use usually prefer the term “drug abuse.” As non-prescription drug use (excluding alcohol) is illegal, any illicit drug use, even casual use, can be regarded as “drug abuse.” From a psychiatric perspective,² “drug abuse” has its own much stricter definition which takes into account patterns of use, degree of impairment in functioning, and the minimum duration of disturbance. Adopting this definition has

² For details, see *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*. American Psychiatric Association, 1994 Washington, DC: APA

the advantage of identifying the most risky drug users which in turn has profound research and policy implications.

Given the data I use for this dissertation, limiting my investigation only to drug abusers like heavy marijuana user or heavy cocaine uses would yield an extremely small proportion of abusers, making it difficult to check the multivariate effects from multiple sources. The problem is further complicated by the fact that many large surveys, though at a national scale, fail to reach some of the highest risk groups of hard-core drug abusers. Considering that drug use as I have defined it is illegal, and that a large proportion of American workers use drugs, the policy implications that can be derived from this study warrant an examination of the wide range of drug users in the working population.

1.6 Research Questions

This dissertation examines the following questions:

1. Do labor force participants differ from unemployed persons in their alcohol and controlled drug use behavior?
2. Do employees' perceived workplace characteristics influence their alcohol and controlled drug use behavior?
3. Do occupational characteristics influence workers' alcohol and controlled drug use behavior?
4. Does drug use influence employees' income growth trajectories?

1.7 Organization of the Dissertation

This dissertation is organized into eight chapters. Chapter 1 presents an introduction to the dissertation. Chapter 2 surveys the major perspectives concerning alcohol and drug use and presents hypotheses. Chapter 3 discusses several major analytic tools utilized in this dissertation, including ordinary least squares (OLS) regression, logistic regression, Poisson regression, negative binomial regression, and growth curve modeling. Also discussed in Chapter 3 are several types of data used in this study. These data sets are from: (1) the National Longitudinal Survey of Youth (NLSY) of the Bureau of Labor Statistics, U.S. Department of Labor; (2) the National Household Survey on Drug Abuse (NHSDA) of SAMHSA, U.S. Department of Health and Human Services; and the (3) the Occupation Information Network database of the Employment and Training Administration, U.S. Department of Labor.

The next four chapters (Chapters 4 through 7) present four related, but distinct, research foci of this dissertation. These foci reflect my particular concerns with obtaining an overview of substance use behavior among labor force participants in a multi-year time span. Chapter 4 attempts both to identify the antecedents prior to employment that may persistently influence alcohol and drug use after they become fully employed, as well as to find the common attributes of unemployed and employed drug users. Chapter 5 examines the relative importance of various job characteristics and personal characteristics in contributing to problematic alcohol and controlled drug use. Chapter 6 investigates structural determinants of workers' alcohol use and controlled drug use across occupations and presents an analytic strategy to examine the potential occupational differences in employees' alcohol abuse and controlled drug use. Chapter 7 attempts to uncover the mysterious relationship between drug use and wage. The final chapter, Chapter 8,

gives a summary and discussion of the study's limitations, as well as suggestions for future research.

CHAPTER II. LITERATURE REVIEW AND HYPOTHESES

Two different but complementary perspectives toward defining and studying drug problems have evolved over the past 30 years. One perspective is grounded in the clinical (or individual) approach, in which unhealthy conditions are attached to individuals. The other is an environmental (or community) approach, in which drug problems are viewed as disorders affecting or affected by social groups such as the family, the workplace, and society. It is the latter—the social and organizational dimensions of these approaches—that will be emphasized in this dissertation.

In support of this study and within the context of organizational behavior, occupational subculture, and labor market outcomes, this Chapter contains a review of the related literature specifically addressing: job characteristics; occupations; and labor market outcomes. A review of the empirical consistencies and inconsistencies gives rise to the formation of the hypotheses to be tested, within the theoretical frameworks.

2.1 Employment and Unemployment

2.1.1 Social Roles

In a work-oriented society, work has social and psychological meaning that goes beyond its economic impact. To become unemployed is to be deprived of a social role and function. The self-image of the unemployed person is changed, as is the pattern of social relationships (Marmot & Madge, 1987).

The literature on the association between unemployment and drinking often conflicts with regard to whether unemployment increases or reduces consumption (Crawford, Plant, Kreitman, & Latcham, 1987). One line of argument has been that due to a lowered income, the unemployed may reduce their consumption of alcohol. Another line of argument has been that unemployment causes emotional and financial stress, which in turn causes increased alcohol consumption (Forcier, 1985). Findings based on large representative sample indicated that for 18- to 34-year-olds' lifetime, prior-year, and current alcohol use,³ employed workers reported more alcohol use than the unemployed. On the other hand, unemployment may engender a pattern of binge drinking since unemployment is believed to produce poorer psychological health and this in turn leads to heavier drinking (Power and Estaug, 1990).

The highest levels of marijuana, cocaine, crack, and heroin use appear to all be found among the unemployed (SAMHSA, 1996). It is noted that no attempt had been made in the above-mentioned reports to control for potentially confounding factors that might explain the observed associations. Finally, a longitudinal study (Power & Estaug, 1990) using National Child Development Study (NCDS) data provided little evidence that early adulthood employment experiences are affected by previous teenage drinking, but showed that these experiences can affect drinking adversely in early adulthood.

Cross-sectional studies in the 1970s consistently find that the unemployed have the highest rates for the use of most drugs, particularly for alcohol and drugs other than marijuana (O'Donnell, Voss, Clayton, Slatin, & Room, 1976; Robin, 1974; White, Aidala, & Zablocki,

³ Lifetime refers to whether the substance had ever been used by the respondent, prior year refers to the 12 months preceding the interview, and prior month refers to the 30 days preceding the interview.

1988). According to O'Donnell and colleagues (1976), the unemployed may be more likely to use drugs because a regular job tends to restrain the extent to which one can indulge, and because people who use drugs are less likely to seek or obtain full-time employment.

In contrast to the relative large body of literature on drinking and employment, few theoretical and empirical examinations can be found on the relationship between drug use and employment status. Evidence has typically shown that employment status and drug use may be uncorrelated. For example, having found that employment status did not function well as a predictor of respondents' drug use after leaving high school, when controlled for living arrangement, Bachman and colleagues (1984) concluded that unemployment would not cause one to become more involved in drugs. Using two time-point longitudinal data of middle-class white adults, White, Aidala, and Zablocki (1988) found no significant differences between current and former users with respect to unemployment, financial status, and job tenure.

2.1.2 *Hypotheses*

H4.1⁴ Employed workers are more likely to be current casual drinkers than unemployed persons.

H4.2 Employed workers are less likely to be current heavy drinkers than unemployed persons.

H4.3 Employed workers are less likely to be current marijuana users than unemployed persons.

⁴ The first number after H corresponds to the number of the analytic chapter, the second number is the hypothesis serial number. Therefore, H4.1 stands for the first hypothesis that will be tested in Chapter 4. This coding scheme applies to all the hypotheses.

H4.4 Employed workers are less likely to be the lifetime cocaine users than unemployed persons.

2.2 Job Characteristics—Importation and Work-Related Strain

The literature offers a number of views on the relationship between job characteristics and drug use. However, no consistent empirical support has been found for the relationship between stressful work conditions and excessive drinking (see Fennell et al., 1981; House et al., 1986).

2.2.1 Theoretical Background

2.2.1.1 Importation

Nearly all treatment programs are either implicitly or explicitly predicated on the assumption that substance abuse and dependence constitutes a medical disease, which employees “import” into the workplace rather than acquire there (Archer, 1977). According to Hollinger (1988), this is appealing to the employers because it attributes drug and alcohol use to factors unrelated to the workplace and its organization. The importation perspective regarding substance use has not yet been clearly articulated in the literature. According to this viewpoint, if intoxication at work is not a function either of a unique occupational culture or of various sources of strain within the organization, then it may result from employees’ “importing” drinking and drug problems into the workplace. Support for this view comes from Cahalan and Room (1974), who found that those occupations with the highest levels of alcohol-related morbidity and mortality also have high concentrations of young men who belong to the segment of the general population with the heaviest drinkers and drug users.

2.2.1.2 Organizational strain

An alternative body of research instead hypothesizes that organizational and occupational factors are causally related to substance abuse in the workplace. This view argues that the workplace as a distinct cultural environment can support or inhibit the development of high-risk or problem drinking (Ames & Janes, 1992). One widely held perspective maintains that the strain and alienation inherent in work settings promote alcohol abuse among employees. Newcomb and Bentler (1988) found that alcohol use over time in a general population sample of adolescents was correlated with a reduction in depression, but no such correlation emerged linking other drug use to depression or other emotional distress. Mangione and Quinn (1975) found a correlation between dissatisfaction with one's job and drug use (as well as forms of counterproductive behavior), albeit only for men older than 30. Dornbusch and Scott (1975) developed and tested a theory of organization-induced strain. They predicted that perceived inconsistencies or incompatibilities in the worker's tasks lead to dissatisfaction for the individual worker. The important incompatibilities shown by these authors to produce strain included conflicting work demands, insufficient information or materials to complete an assigned task, dependence on unreliable or incompetent co-workers, unfair evaluations and allocations of rewards, and incompetent supervisors.

2.2.1.3 Sociocultural factors

In general, the sociocultural interpretation suggests that Whites, men, and persons from higher socioeconomic status groups feel a greater acceptance of, or orientation toward, alcohol use (Jessor & Jessor, 1975). Alcohol users are more likely to come from middle-class households that permit casual drinking, to have an affiliation with religious denominations that do not

condemn ceremonial drinking, and adhere to middle-class values that are more accepting of alcohol use in social situations (Parker, Weaver, & Calhoun, 1995). In fact, research has shown that middle-class culture is more accepting of casual drug consumption in general. Peer pressure and personal circumstances, along with familial characteristics, may contribute to higher levels of drug use among certain groups (Parker, Weaver, & Calhoun, 1995).

2.2.1.4 Contingency model

The person–environment fit model presented by French, Caplan and Van Harrison (1982) and Johnson and White (1995) proposes that environmental demands will only be experienced as stressful if they are incongruent with an individual’s preference or needs.

2.2.1.5 Gender

Research on the problems of alcoholics and drugs addicts provides some support for the hypothesis that substance abuse is related more strongly among women to psychological problems, and among men, to social and behavior problems among men (Robbins, 1989). Female alcoholics and drug users may experience greater shame and depression (Rosenbaum, 1981), while men usually engage in substance abuse in response to job loss, accidents, and interpersonal violence (Knutfer, 1982). Furthermore, substance-abusing women encounter greater rejection from society, when compared to men.

2.2.2 Hypotheses

Parker and Brody (1982) and Hollinger (1988) contend that the phenomenon of employees’ working under the influence (WUI) of alcohol or other drugs requires a multiple-theory explanation. The current research in this dissertation will be guided by a combination of the theoretical perspectives presented above.

Some studies have demonstrated links between problem drinking and aspects of the work situation. For example, workers are more likely to be problem drinkers if they are blue-collar, manual, or low-skilled workers (Warkhov, Bacon, & Hawkins, 1965; Archer, 1977; Cahill & Volicer, 1981), if they have low levels of job satisfaction (Seaman, 1981), poor opportunities for promotion (Trice, 1965), high levels of absenteeism (Ferguson, 1973; Observer & Maxwell, 1959), and lowered job efficiency (Asthma et al., 1980). As mentioned above, studies focusing on downsizing have shown that when seeing coworkers being laid off, surviving employees became narrow-minded, self-absorbed, and risk averse. The resulting constellation of symptoms, including sinking morale and decreased productivity, has been termed the “survivor’s syndrome” (Leana & Feldman, 1992). If one applies this reasoning to drugs in the workplace, it also seems likely that employees—when perceiving low chances of promotion, lower pay, and job insecurity—may turn to drug and alcohol use. On the basis of this body of prior research, I hypothesize the following:

H5.1: Employees working in manual labor positions are more likely to use alcohol or drugs than workers in other occupations.

H5.2: Employees who have higher satisfaction with regard to promotion prospects and/or current pay are less likely to use alcohol or drugs.

Substance use can be viewed as a means for coping with the pressures and demands of work. Alcohol and illicit drugs are used in part as anti-anxiety agents or antidepressants to alleviate consequences of stress induced by work conditions (Gupta & Jenkins, 1984). Alienated labor and a sense of powerlessness have been discussed as risk factors in the sociological literature. Strong feelings of powerlessness are associated significantly but modestly with drinking and with drinking problems (Seeman, Seeman, & Budros, 1988). Using “job latitude”

(Karasek,1979) as an index of the respondent's degree of independent decision making and skill involvement in work, Seeman et al. (1988) found that such variables were not consistently significant variables in drinking problems. Therefore, since it appears that with regard to work, people take drugs not to induce pleasure but to reduce displeasure (Milbourn, 1984), I hypothesize:

H5.3: Employees with less job stress, as indicated by higher overall job satisfaction, are less likely to be current drinkers or drug users.

Employees who work alone or in small groups and who move between different locations are at high risk since they have greater opportunity to use alcohol or drugs during the workday.

H5.4: Job insecurity is related positively to alcohol or drug use.

H5.5: Negative physical conditions are related positively to alcohol or drug use.

Using a sample of 450 employed males, Seeman and Anderson (1983, 1988) reported conclusive evidence of the relationship between powerlessness and substance use. Their data did not support the link between work experience (such as job mobility) and drinking. However, drug users tend to change jobs more frequently. Since no conclusive causal direction has been established in the literature, I hypothesize:

H5.6: Employees who have changed jobs more frequently in the past are more likely to be current drinkers or drug users.

Only moderate to low bivariate correlations have been found with regard to the relationship between job satisfaction and substance use (Jessor & Jessor, 1977; Newcomb, 1988). Looking at adolescent research for a moment, Kaplan raised a self-defense hypothesis for delinquent behavior by reasoning that adolescents with low self-esteem may turn to such behavior

to avoid a negative self-attitude and to maintain a positive self-attitude. However, a recent study by Jang and Thornberry (1998) found little empirical support for this hypothesis. These findings raise two questions: (1) Can this hypothesis be extended from youth to adults? and (2) Can the finding for delinquency generally be replicated for more specific forms of deviant behavior such as drug use?

I include self-esteem in the current analysis and hypothesize:

H5.7: Global positive self-esteem would affect substance use moderately.

While some early studies provide evidence consistent with these hypotheses, they are limited by their lack of statistical controls, use of cross-sectional data, and statistical methods.

2.3 Occupation—Work Culture and Tension Reduction

2.3.1 Occupational Culture and Tension Reduction

Deviance is not without purpose, function, or goal (Bryant, 1990). Why might workplace drug use be so prevalent? One proposed theory is that the characteristics of an individual's occupation may contribute to drug consumption.

Organizational actors define reality in terms of their own background and values (Hall, 1991). Therefore, the overall conditions of the workplace are the objective properties of the environment combined with the subjective assessment of conditions by the workers. Hence, to study workers' alcohol and drug use, it is necessary to put the investigation in a larger structural context, such as that of organizations, occupations, and industries.

This study consults, is informed by, and integrates three broad streams of perspectives: the occupational subculture, the nurturing "vitamin" components that support the operating

mechanism of the subculture, and the tension-reducing mechanisms that may inducive to the alcohol abuse and controlled drug use.

It is recognized that proposed explanations for alcohol abuse rarely address the impact of the occupational setting (Trice & Sonnenstuhl, 1988). Pearlin (1989) argues that sociological study of the stress process entails an examination of “the presence of similar types and levels of stress among people who are exposed to similar social and economic conditions.” Though recent years have witnessed an increasing number of studies focusing on organizational stress in the sociological, psychological, and managerial literature, few make direct, systematic, and quantitative explorations of potential occupational and/or industrial effects on workers’ substance use, so that the field remains plagued by inconsistent and inconclusive results. Some studies have found that substance abuse varies across occupations depending on the level of stress or lack of decision-making power associated with a job (Shahandeh, 1988). Other studies, such as Mensch and Kandel (1988a), have found no significant difference in substance abuse across occupations when examining the Karasek et al. (1982) job characteristics such as skill, employee discretion, job insecurity, supervisor support, and physical demands of the occupations. Roman (1981) finds that workers with more mobility and task independence at work are more prone to alcoholism. This result does not appear surprising, since one might expect that the more closely a worker can be monitored, the higher the probability of being caught, and the less likely such a worker would be to use drugs on the job. It is problematic whether specific subgroups of workers are more prone to drug use, or whether certain jobs are likely to have a prevalence of high drug use, regardless of what type of worker fills them (Parker & Farmer, 1988).

Does one's occupation matter when it comes to alcohol and drug use? Before we can answer this question, it is necessary to identify job features in order to understand what makes one occupation different from another. In considering possible precursors of adult mental health, Warr (1987, 1994) presents a framework that contains nine features of jobs and other environments which are assumed to underlie mental health. These nine features include opportunity for control, opportunity for skill use, externally generated goals, variety, environmental clarity, availability of money, physical security, opportunity for interpersonal contact, and valued social positions. This framework is suggested by Warr to capture the pattern of relationships between an environmental feature and an aspect of mental health, such as stress. Though the label of "vitamin" model is associated with this collection of occupational features, it falls well into the sociological domain, which stresses (among other things) the importance of social and structural factors.

The belief that work stress promotes heavy or problematic alcohol use is widely accepted (e.g., Gupta & Jenkins, 1984; Herold & Conlon, 1981; Miller et al., 1988; Trice & Roman, 1978). However, few studies provide convincing empirical support for this notion (Cooper, Russell, & Frone, 1990). Studying alcohol and drug use in the labor force without careful consideration of the potential effects of occupation may not be complete in and of itself. Sociological inquiry has a long tradition exploring the subculture influencing workers' behaviors. In this vein, sociologists have been interested in how social roles may generate stressful circumstances (Avison & Gotlib, 1994). From this tradition, I will explore a variety of job characteristics in the occupational context that influence alcohol and drug use behavior. Since a large body of literature exists on the comorbidity of mental health and drug use (Kessler, McGonagle, Zhao, Nelson, Hughes,

Eshleman, Wittchen, and Kendler, 1994; Kessler, Nelson, McGonagle, Edlund, Frank, and Leaf, 1996), it appears plausible to apply the set of environmental features defined in this research to substance use studies.

The fundamental logic of an expected association between job stress and substance abuse is the basic “coping and withdrawal” hypothesis. Tension-reduction theory proposes that alcohol reduces tension and that people drink it for this property (Cappell & Greeley, 1987); similarly, people are said to use drugs for pleasure, relaxation, and enhanced energy. Incorporating epidemiological and psychological concerns under the umbrella of sociology, I plan to investigate the potential effects of macro socioeconomic conditions, such as occupation and industry, in shaping an individual employee’s alcohol and drug use behavior.

2.3.2 *Hypotheses*

Eight hypotheses tie these dimensions of occupation to a workers’ alcohol and drug use behavior. I classify these hypotheses as (1) the *job demands and task characteristics*, which include job autonomy, job variety, work schedule, and underutilization of skills, and (2) the *occupational characteristics and conditions*, including job security, job compensation, and work conditions.

2.3.2.1 Job demands and task characteristics

Occupational task characteristics have been found to be related to an employee’s psychological functioning in all aspects of life (Kohn & Schooler, 1973). In particular, the use of initiative, thought, and independent judgment can be facilitated or restricted at work. Jobs that facilitate such self-direction may produce in employees a more positive reaction to themselves and

society as well as to the job, as opposed to alcoholism appearing as the expression of a frustrated need for power (McClelland et al., 1972).

A survey (Markowitz, 1984) of 625 full-time employees in 11 organizations examined specific job characteristics that may contribute to feelings of competence and self-determination, including personal power in the organizational hierarchy, participation in decision-making, job autonomy, and job responsibility. The author's result supports the notion that aspects of one's job are associated with, and may help induce, alcoholism among employees.

Karasek's (1979) theory of occupational stress proposes "job decision latitude" to be a favorable factor in occupational stress, a concept very similar to job autonomy. One study (Greenberg & Grunberg, 1995) testing this theory sampled production workers from a variety of wood product mills in the Northwest. In this study, the authors found that low use of capacity, low job autonomy, and low participation in workplace decision-making had minimal direct effects on heavy drinking and drinking problems, once background factors were controlled.

H6.1a: Employees who have a higher level of job autonomy are less likely to use alcohol heavily than employees who have less autonomy.

H6.1b: Employees who have a higher level of job autonomy are less likely to use drugs than employees who have less autonomy.

Workload has been found to be a major cause of stress in some research (Ratsoy, Sarros, & Aidoo, 1986), but not all (Del'Erba, Pancheri, & Intreccialagli, 1988). While professionals such as musicians and writers have been frequently cited as using drugs to improve performance, only small and insignificant associations have been found between drug use and workload or stress for managers and supervisors (Peterson, 1999). The relationship between qualitative and quantitative

overload and substance use remains unexplored and unclear. Due to the positive correlation between workload and stress and theoretical considerations of the occupational environmental facets, it is preferable to include workload as a type of job demand in the analytical model, to avoid the potential confounding contamination.

Given the mixed findings in the literature, I hypothesize that

H6.2a: With regard to alcohol use, employees in occupations associated with heavy workloads do not differ much from employees in other occupations associated with lighter workloads.

H6.2b: With regard to drug use, employees in occupations associated with heavy workloads do not differ much from employees in other occupations associated with lighter workloads.

Job variety refers to the scope and range of tasks on the job. Previous researchers, such as Trice and Roman (1972) and McLean (ed., 1972), have reported that dissatisfaction, boredom, and anxiety in some jobs encourage heavy drinking. Workers are said to frequently block out monotony and boredom with alcohol and drugs (Runcie, 1980, 1988).

H6.3a: Employees who have a higher level of variety in their jobs are less likely to use alcohol than employees who have less variety in their jobs.

H6.3b: Employees who have a higher level of variety in their jobs are less likely to use drugs than employees who have less variety in their jobs.

Few studies have examined employees' lack of opportunity to use their skills and its relationship with alcoholism and drug use. In the more general stress and health literature, some find that underutilization of skills is found to have little relationship with somatic ill health

(O'Brien, Dowling, & Kabanoff, 1978), while others have found that negative attitudes, distress, and ill health result from underutilization of skills (Spillane, 1984; Lowe & Northcott, 1988).

H6.4a: Employees working in positions that better utilize their skills are less likely to use alcohol than employees who are not.

H6.4b: Employees working in positions that better utilize their skills are less likely to use drugs than employees who are not.

Strong workplace interpersonal relationships may generate pressure and conflict.

According to Kahn, Wolfe, Quinn, and Snoek (1964:382), interpersonal relationships yield pressure on people: "The greatest pressure is directed to a person from other people who are in the same department as he is, who are his superiors in the hierarchy, and who are sufficiently dependent on his performance to care about his adequacy without being so completely dependent as to be inhibited in making their demands known." From this argument, the source of pressure and conflict for workers can be expressed rather fully in terms of their interpersonal relations with these sources. On the other hand, lack of supervision and monitoring provides more privacy to employees and thus is associated with the tendency to use alcohol or drugs on the job. Besides, interpersonal relationships constitute the social resource that may provide (1) emotional support, bolstering feelings of self-esteem and belonging, (2) informational guidance, aiding in the assessment of potential threats and planning of coping strategies, and (3) tangible assistance (Cohen & McKay, 1984). Given this mixed prediction, I do not expect a significant relationship between the interpersonal relationship and the employees' alcohol and drug use behavior. I therefore hypothesize:

H6.5a: Employees who usually work on their own are not different in their alcohol use behavior than employees who work in teams.

H6.5b: Employees who usually work on their own are not different in their drug use behavior than employees who work in teams.

2.3.2.2 Occupational characteristics and conditions

In their national study of 23 occupations, Caplan et al. (1975) report that job future ambiguity was one of the many stressors that are related to workload dissatisfaction and boredom, which are proposed as intervening variables leading to psychological and somatic complaints.

Catalano and colleagues (1986) argue that workers' perception of employment security is affected by unemployment rates, and that perceived employment insecurity is related to increased help-seeking. However, they do not empirically examine this hypothesis, instead focusing on workers' perceived employment security as it is affected by economic conditions.

This examination of an ecological link to individual outcomes has been undertaken by other researchers as well. According to Brener (1987), when macroeconomic conditions force a firm to reduce its labor force, remaining employees will experience fear of employment loss and destruction of careers, as well as increased work stress resulting from lower tolerance for error, closer supervision by management (with loss of autonomy), demand for higher level of productivity, and possible decreases in wages or promotion opportunities. However, the mechanism for explaining individual outcomes is not empirically examined in Brener's report.

Using data from the 1973–1977 Quality of Employment Panel Study, Fenwick and Tausig (1994) test a model that conceptually links research on macroeconomic causes of stress with research on job-structure-related causes of stress among employed workers. They find that higher

occupational unemployment rates increased stress. Overall, their results indicate that macroeconomic change, such as recessions, can affect individual stress because it leads to changes in routine job structures that represent increased and continued exposure to stressful conditions.

H6.6a: Employees who have a higher level of job security are less likely to use alcohol than employees who have a lower level of job security.

H6.6b: Employees who have a higher level of job security are less likely to use drugs than employees who have a lower level of job security.

While employment security at the structural level may be a source of stress, making employees more vulnerable to using alcohol or drugs to cope, the employment rates released to the public may contain measurement error introduced by the segment of underemployment. When labor force supply surpasses the demand for certain occupations, employees' income in those occupations may be adjusted downward, or the comparable upward adjustment may be suspended or slowed. The income level of a certain occupation reflects the socioeconomic status of the job. Consequently, having commanded a higher job pay, or being associated with an occupation that pays well, may cause an employee to be less likely to drink heavily or use drugs.

H6.7a: Employees who have a higher level of compensation are less likely to use alcohol heavily than employees who have a lower level of compensation.

H6.7b: Employees who have a higher level of average compensation are less likely to use drugs than employees who have a lower level of compensation.

In an observational study, Sonnenstuhl and Trice (1987) document the pervasiveness of heavy drinking norms in both on- and off-the-job drinking among "sandhogs" engaged in tunnel building in New York City.

H6.8a: Employees who work under good working conditions are less likely to be heavy drinkers than employees who work under less desirable conditions.

H6.8b: Employees who work under good working conditions are less likely to use drugs than employees who work under less desirable conditions.

2.4 Labor Market Effects

A large body of literature exists on the labor market effects of substance abuse, specifically, on the relationship between substance abuse and other job performance measures such as absenteeism, accidents, turnover, and medical costs. However, relatively little is known about the possible consequences of controlled drug use on occupational careers and earnings in adulthood.

Recent literature has demonstrated an increasing interest in the use of wage and income as measures of employees' job performance. The results concerning the relationship between regular marijuana use and economic activities such as wages, however, appear to be inconsistent. For example, it has been found that drug use and wages are unrelated (e.g., Jessor, Donovan & Costa, 1991; Kaestner, 1994; White, Aidala & Zablocki, 1988) and that drug use is related to higher wages, though some of the effects are modest in size (Gill & Michaels, 1992; Kandel & Davis, 1990; Kaestner, 1991, 1994; Mijares, 1992; Register & Williams, 1992). Another line of argument is that the impact of drug use on earnings varies depending upon whether the workers are in an early or a later stage of their careers (Mullahy & Sindelar, 1991, 1993).

2.4.1 The Economic Theory

There is a perception, grounded in economic theory, that higher wages lead to increased drug use (Kaestner, 1991; Michael & Becker, 1973). Efficiency wage theory emphasizes a positive relationship between relative wage levels and workers' productivity. The fact that drugs are a consumable good makes the level of such use dependent on income. Since wages constitute a large portion of income, an increase in the wage will lead to an increase in the consumption of drugs, assuming drugs are a normal commodity. Thus, individuals with higher wages will be expected to have higher levels of drug use. For example, the popularity of cocaine use among the college-educated might be partly due to an income effect associated with the consumption of drugs (Kaestner, 1991). It is natural to suspect that this thesis holds only for high-priced drugs like heroin and cocaine and does not apply to alcohol, crack, or marijuana.

Berger and Leigh (1988) find that among both men and women, drinkers receive higher wages than nondrinkers. Using 1994 National Longitudinal Survey of Youth (NLSY) data, Kaestner (1991) indicates that illicit drug use is not associated with lower wages. Having thoroughly reviewed the literature three years later, Kaestner (1994) notes that the previous studies on this subject have all been cross-sectional in nature. Unfortunately, his own study (1994) using the 1988 data are again cross-sectional in nature. In addition, no discussion of potential confounds is presented. Questions such as whether those who drink earn higher current wages at the expense of future earnings remain unanswered.

With regard to adolescents, not only does drug use potentially affect their short-term functioning and development during a time of rapid change and growth, but it also brings into question their long-term functioning (Stein, Smith, Guy, & Bentler, 1993). Stein and colleagues

note that studies need to control for the influence of concurrent drug use to determine if there is a long-term effect of earlier drug use on later functioning, beyond the influence of concurrent drug use. The review of the literature on the drug use–wage relationship is inconclusive. For instance, even though drug use has been found to be associated with higher wages (Gill et al., 1992; Kaestner, 1991; Kaestner, 1994), it is difficult to establish whether the drug problems precede higher wages or whether the drugs are used as a result of higher wages.

Using a sample of municipal workers from a large city in the southwestern United States, Lehman and Simpson (1992) investigated whether substance abuse contributes unique variance to the prediction of job behaviors after controlling for variance associated with personal and job background domains. They found that substance use adds unique variance to the prediction of psychological and physical withdrawal behavior, but does not contribute to antagonistic work behavior.

2.4.2 Labor Market Theory of Wage Compensation

In a fiscal sense, employees work for incomes. According to Lazear (1979), firms may adopt a strategy to sequence pay, whereby workers are paid a relatively low wage early in their tenure, and to compensate, pay workers more than they could get elsewhere, based on marginal productivity, later in their careers to compensate. This would explain why some employees with long-term goals usually choose to stay in an organization. On the other hand, according to Borjas (1981), in the short run, job mobility leads to wage gains. Factors like these which lead to wage gains may have two implications for substance abusers. First, drug users, who may tend to have low aspirations and low commitment to success, tend to change jobs more frequently (Kandel & Yamaguchi, 1987). They might also enter the labor force earlier if they drop out of school. This

timing gives them more job experience and thus enables them to earn higher wages than their peers in their early twenties. But in the long run, they do not enjoy high wage growth. Second, nonusers of drugs, who usually have higher education background than drug users, may be willing to accept a job at a relatively lower wage level but with a long-term prosperity potential. With passing years, as suggested by the wage-sequencing thesis, nonusers of drugs will have higher rates of earnings growth.

2.4.3 Lifecycle Approach

Wohlwill (1973) was among the first to distinguish explicitly between developmental aspects of individual differences and the role of individual differences in development. However, Mullahy and Sindelar (1993) first addressed the importance of examining the relationship between alcohol use and job performance in a lifecycle context. The lifecycle hypothesis proposes that teenagers and young adults (i.e., 18 to 29 years old) who consume heavy amounts of alcohol may delay or drop out of formal schooling and enter the labor market at a relatively young age. Using an Epidemiological Catchment Area (ECA) survey in the New Haven area with a sample size of 5,000 aged 22–64, they found that the mean difference of the income measure across whether the respondents had ever had alcoholism in their lifetimes depended on which age group was used. In particular, they found that for persons aged 22 to 29, mean income was higher for those who had alcoholism in their lifetimes than for those who had no alcoholism. For those aged 30 to 59, they found the reverse relationship. Over time, however, at least two factors may narrow this gap and possibly reverse the sign of the relationship. First, the cumulative effects of heavy drinking may dampen wage growth and cause earnings profile to flatten. Second, the investment in education will open up more opportunities for the non-heavy drinkers, leading to a much steeper growth in

earnings. As this non-heavy-drinking cohort enters “prime age” (i.e., 30 to 59 years old), their earnings may begin to overtake the earnings of heavy drinkers. Mullahy and Sindelar (1993) suggested that the effects of alcoholism vary in important ways over the lifecycle. They later focused their study solely on what they called the prime-aged group 30 to 59. They concluded that whether alcoholism had positive, negative, or no effect on income depended critically on age. Obviously, their conclusions were solely based on cross-sectional data.

Having realized the importance of identifying the potential impact of drug use on wages in different phases of workers’ careers, as workers age from their late twenties to their mid-thirties, Kandel, Chen, and Gill (1995) conclude that the opportunity to observe individuals beyond their twenties over a longer period of labor force participation provides new insights regarding the impact of drug use on labor force performance, specifically earnings and rates of wage growth. The statistical method they used, however, allowed them to examine only two time points separately in the regression analyses, and they thus were unable to predict the actual growth trajectories of the earnings.

Lifecycle hypothesis is argued to be very important by several researchers. However, the empirical studies have been limited by the fact that either cross-sectional data were used (Mullahy & Sindelar, 1993) or only one time point measure of the income was modeled (Kandel, Chen, & Gill, 1995; Mullahy & Sindelar, 1993). Empirical tests have been further hampered by the statistical methods used. In general, two time points provide an inadequate basis for studying change (Rogosa et al., 1982). Despite the criticism that “research on individual change rarely identifies an explicit model of individual growth” (Bryk & Raudenbush, 1992), and until now, it

appears that no effort has been undertaken to explicitly model the earnings growth itself together with the mean structure of the earnings, in order to fully respond to these concerns.

Recent development in the statistical theory of hierarchical linear models (HLMs) now enables an integrated approach for studying the structure of individual growth. In subsequent sections, I test the lifecycle hypothesis using the hierarchical growth curve modeling technique with longitudinal time-series data on the earnings from 1988 to 1993. This effort examines both intra-individual change and inter-individual differences.

2.4.4 Hypotheses

Drug users may change jobs more frequently than nonusers (Kandel & Yamaguchi, 1987). Thus, users in their twenties who are beginning their careers may take jobs that require less long-term commitment. Meanwhile, nonusers may accept a relatively low-wage job, but with long-term employment potential and future higher-than-market wages (Kandel, Chen, & Gill, 1995). Based on this argument and also considerations presented above, I derive the following hypotheses:

H7.1a: Employees' current alcohol uses are positively associated with their current incomes;

H7.1b: Employees' current alcohol uses are associated with significantly higher growth rates on income;

H7.2a: Employees' current marijuana uses are positively associated with their current incomes;

H7.2b: Employees' current marijuana uses have positive impacts on their growth rates on income;

H7.3a: Employees' lifetime cocaine uses are positively associated with their current incomes;

H7.3b: Employees' lifetime cocaine uses have positive impacts on their growth rates on incomes;

H7.4a: Employees' education levels are positively associated on the mean income

H7.4b: Employees' current education levels have positive impacts on their earnings growth rates.

H7.5a: Employees' job seniorities are positively associated with their on the mean income

H7.5b: Employees' job seniorities have positive impacts on their earnings growth rates.

2.5 Summary

This dissertation is designed to focus on four aspects of alcohol and controlled drug use: (1) To determine the main and interaction effects of employment status on young people's alcohol and drug use behavior, (2) to identify the effects of perceived quality of work on alcohol and controlled drug use, (3) to investigate the potential moderating effect of alcohol and controlled drug use on how workers derive their job satisfaction, and (4) to examine whether alcohol and controlled drug use influence employees' income and income-growth trajectories. Though unemployed persons were included in the preliminary analyses, the major body of this dissertation used a restricted representative sample of employed workers only.

CHAPTER III. DATA AND METHODS

3.1 Data Sources

For the analyses in all the analytic chapters except Chapter 6, the sample has been drawn from the young cohort of the National Longitudinal Survey of Labor Market Experiences—Youth (NLSY) data, a survey funded by the U.S. Department of Labor. The Center for the Study of Human Resources at Ohio State University designed the interview schedules, and the U.S. Bureau of the Census and NORC - University of Chicago - drew the samples, conducted interviews, and processed the data. The NLSY is a longitudinal data set initiated in 1979 by the Department of Labor in order to study the transition of young persons into the labor force. The 1979 panel included 12,686 respondents who were between the ages of 14 and 21 as of January 1, 1979. The respondents have completed annual interviews since 1979; by the sixth wave of the NLSY in 1984, approximately 95 percent (12,069) of the original respondents had remained in the study; by the tenth wave of the NLSY in 1988, approximately 82 percent (10,465) of the original respondents had remained in the study; by the fourteenth wave of the NLSY in 1992, approximately 71 percent (9,016) of the original respondents had remained in the study (Bureau of Labor Statistics, 1995). The sample that I will use in this dissertation comes from the database on the National Longitudinal Survey of the Work Experience of Youth: 1979–1993. A variety of variables (e.g., age, sex) will be drawn from different years ranging from 1979 to 1993. The drug and alcohol use items will be fixed and drawn from the 1984, 1988, and 1992 wave data.

Since all the NLSY data are self-reported, there is the possibility of underreporting of substance use. For example, Mensch and Kandel (1988b) suggested that there might be some

underreporting in the NLSY 1984 data, particularly with regard to cocaine use. As underreporting remains a potential problem, less significant empirical results for cocaine use than for marijuana use may be expected.

For the analyses in Chapter 6, I combine data from two sources. The individual level data on full-time workers used in this study are drawn from the 1997 National Household Survey on Drug Abuse (NHSDA). Additional occupational level data are drawn from the relational database in the 1998 Occupation Information Network, or “O’NET 98.”

The NHSDA is a personal-interview survey of individuals age 12 and older residing in U.S. households and civilian, noninstitutional group quarters—a surveyed population that comprises about 98 percent of the U.S. population ages 12 and older. The NHSDA has been conducted regularly since 1972, but my analysis is restricted to the most recent year, 1997.

O’NET 98 (O’NET, 1998) is sponsored by the Department of Labor’s Employment and Training Administration (DOL/ETA). Information in O’NET 98 is based largely on data from sources such as the Dictionary of Occupational Titles (DOT). The Department of Labor is replacing its Dictionary of Occupational Titles (DOT) with a new occupational information system known as O*NET: the Occupational Information Network. O*NET is designed to identify and describe worker characteristics, catalog key attributes of occupations across jobs in the American economy, and describe and link the work and labor market context for different jobs and organizations. O’NET 98 provides valid and reliable occupational information that may be useful for a variety of purposes, such as career counseling, development of job training programs, skill standards, and labor market information. It should be noted that O’NET 98 occupational

information is composite information from many jobs and therefore not intended to describe any particular job.

3.2 Analytic Samples

In the analytical sample for Chapter 4, both employed and unemployed persons are included. Those who were out of the labor force and those who were in active forces were excluded from the analysis. In the subsequent analyses after Chapter 4, the data are limited to persons who were employed in 1988 ($emp88=1$), and omitting those who were unemployed, self-employed, and working without pay ($classw88 = 1$ or $classw88 = 2$).

For analyses in Chapter 6, based on my literature review, I identified a set of the occupational characteristics. Using PROC SQL in SAS, I then obtained a subset of occupational characteristics from O'NET 98 database, which I merged with the NHSDA utilizing the common key, or occupation titles.⁵ The merged data used in the current analysis are restricted to full-time workers aged 18 to 49. The total sample size is 7,892. These full-time workers are nested in 383 occupations and 234 industries.

⁵ NHSDA uses the Census standard occupation classification (SOC), but O'NET uses its own occupational code. I checked manually the codes on the 383 occupation titles appearing in NHSDA 97 based on the descriptions of the occupation titles and constructed a one-to-one intermediary converting file before merging the two sets of data together.

Table 3.1. Descriptions of the Analytical Sample (N = 7,892)*

	Number	Grand Mean**	Grand Median***
Occupation	383	20.6	8
Industry	234	33.7	13

Note: *Restricted to full-time workers ages 18 to 49 years old only. **Refers to the average of the mean numbers of respondents within occupations or industries. ***Refers to the average of median numbers of respondents within occupations or industries.

In Chapter 6, I use the entire individual workers sample exclusively for the 383 occupations or the 234 industries. I do this for several reasons: First, because of the potential “mis-specification of the model at the individual level” (Died-Roux, 1998), the observed “contextual or group effect” may be due to the omission of individual-level variables related to the outcome and to group characteristic investigated (Blalock, 1984). As such, substance abuse research seeking subcultural explanations must encompass forms of personal influence that are independent of group membership. Second, the small size of the occupation-alone sample may lack both the explanatory power as well as the inference power to the individual worker level. Third, in using occupational-level characteristics at the individual worker level, standard errors in statistical models tend to be underestimated, since, for example, workers may cluster within occupations. The shortcomings, however, are not serious, as confirmed by the subsequent analysis using the multilevel analysis technique.

3.3 Measurement

Generally, alcohol, marijuana, and cocaine use are the three types of substances examined in the following analyses. Five types of scales of alcohol and drug use are used in the study. These include frequencies of use, current use, prior-year use, lifetime use, and number of occasions

using drugs. Current users are defined as those who said they used alcohol or marijuana or cocaine in the prior 30 days. Detailed descriptions of the variables used are presented in the subsequent chapters.

3.4 Methods

The statistical methods used to analyze the antecedents and consequences of alcohol use and illicit drug use among workers include the following.

3.4.1 Logistic Regression

Several dependent variables used in this dissertation are binary response variables. Using OLS would violate the normalcy assumption, since binary response of substance use has a skewed frequency distribution. I thus employ the logit regression procedure PROC LOGISTIC in SAS. Multivariate logistic regression will be performed on alcohol, marijuana, and cocaine use. Each of these three drug categories will be analyzed separately.

Odds ratios together with the logistic regression coefficients are presented in the analyses in the following chapters. An odds ratio is not a separate measure of the relationship between the dependent variables and the independent variables, as it contains the same information as the logistic regression coefficients.⁶ However, it is relatively easy to interpret. As the odds ratio provides exactly the same ordering as the unstandardized logistic regression coefficient, the standardized logistic regression coefficients are also presented in the tables in this chapter to

⁶ Odd (Y=1) = $e^{\text{logit}(y)}$.

evaluate the relative strength of the influences of the independent variables on the dependent variables.⁷

I use two formal statistical tests for the goodness-of-fit of the logistic regression models in this chapter. First, I use a goodness-of-fit test developed by Hosmer and Lemeshow (1989) for logistic regression models with binary responses. This test involves dividing the data into approximately 10 groups of roughly equal size based on the percentiles of the estimated probabilities. The observations are sorted in increasing order of their estimated probability of having an event outcome. The Hosmer and Lemeshow goodness-of-fit statistic is obtained by calculating the Pearson chi-square statistic from the $2 * g$ table of observed and expected frequencies, where g is the number of groups. In addition, I adopt the generalized coefficient of determination for general linear model proposed by Cox and Snell (1989), Maddala (1983), and Magee (1990).

3.4.2 Poisson Regression

Social science researchers frequently encounter a situation where the count of the number of times for certain events or behaviors is the study object of the social science. Though count variables are often treated as though they are continuous and the linear regression model is applied, it is not appropriate to do so. Using ordinary regression analysis for count outcomes can result in inefficient, inconsistent, and biased estimates (Long, 1997). In these circumstances, the Poisson regression model should be used. In the past, Poisson regression has been applied to a variety of areas, such as analyzing factors affecting how frequently a person visited the doctor

⁷ Odds ratios can be converted back to the probability that $Y = 1$:
 $P(Y=1) = \text{Odds}(Y=1) / [1 + \text{Odds}(Y=1)]$

(Cameron & Trivedi, 1986), the effect of research and development expenditures on the number of patents received by U.S. companies (Hausman et al., 1984), the emergence of new companies (Hannan & Freeman, 1989), intergroup competition and evolution of hotel populations (Ingram & Inman, 1996), and the sequencing of social movement (Minkoff, 1997). However, very few studies have applied Poisson regression modeling to alcohol and drug use (Mullahy, 1986).

In the Poisson regression model, the number of events (y) has a Poisson distribution with a conditional mean that depends on an individual's characteristics, according to the structural model:

$$\mu_i = E(y_i | x_i) = \exp(x_i \hat{\alpha})$$

The baseline Poisson model takes the form:

$$\Pr(y_i | x_i) = \exp(-\mu_i) \mu_i^{y_i} / y_i!$$

where y is a random variable indicating the number of times that an event has occurred during an interval of time.

As part of the analyses in Chapter 5, I model the employees' drug use in the month prior to the survey through Poisson regression using PROC GENMOD in SAS.

3.4.3 Negative Binomial Model

The Poisson regression model is a pure ideal model. In many models, the conditional variance is greater than the conditional mean, a situation referred to as overdispersion. Overdispersion has an effect similar to heteroscedasticity in the linear regression model. It allows for consistent estimations of parameters, but the standard errors from the Poisson regression model will be biased downward, and the z-test may overestimate the significance of the variables (Long, 1997).

In a separate modeling analysis, I extend the Poisson regression by adding a parameter that allows the conditional variance of y to exceed the conditional mean. This is the negative binomial regression model. The most common motivation is to tackle the unobserved heterogeneity. In the Poisson regression model, variation in the conditional mean of y given x ($\mu = \exp(x\hat{\alpha})$) is known as the observed heterogeneity. Here, observations with the same x will have the same μ , but in the negative binomial model, because of the unobserved heterogeneity, for a given combination of values of the independent variables, there is a distribution of μ s rather than a single μ . I use a SAS Macro program designed by Hilbe (1994) to accomplish this task.

3.4.4 Growth Curve Modeling

When modeling the relationship between drug use and employees' earnings over time, I utilize growth curve methodology, which affords an integrated approach for studying the structure and predictors of individual earnings growth.

This analytic approach is analogous to what is suggested as the developmental model. Duncan and Duncan (1995) depicts two appropriate attributes of a developmental model:

An appropriate development model is one which not only describes a single individual's developmental trajectory, but also captures individual differences in these trajectories over time. If, for example, these trajectories produced a collection of straight lines for a sample of individuals, the developmental model should reflect individual differences in the slopes and intercepts of those lines.

Another important attribute of the model would be the ability to study predictors of those individual differences to answer questions

about which variables exert important effects on the rate of development.

Growth curve methodology meets these criteria.⁸ It enables an integrated approach for studying the structure of individual growth and estimating important statistical properties of collections of growth trajectories. It allows explicit tests of the hypotheses about the growth trajectories and identification of the variables that are associated with the variation of the growth trajectories.

3.5 Procedure

In the next four chapters, I examine first the main effects and interaction effects of employment status on a set of alcohol and drug measures. I then conduct multivariate tests of the importation perspective and the work–stress perspective through logistic regression, Poisson regression, and negative binomial regression. I further investigate the potential influences of occupation characteristics on individual worker’s alcohol use, abuse, and controlled drug use behavior. Finally, using growth curve methodology and longitudinal data, I inquire about systematic inter-individual differences in changes of earnings (i.e., whether individual change over time differs from person to person in systematic and interesting ways).

⁸ Growth curve approach is superior to the autoregressive approach when it comes to identifying important predictors of change (Duncan & Duncan, 1995). Panel models are not optimal for studying either linear or nonlinear growth process because the best that can be done even in multiwave data is to focus on simple change scores between any two points in time (Rogasa, 1988).

CHAPTER IV. PRELIMINARY ANALYSIS: DO LABOR FORCE PARTICIPANTS DIFFER FROM THE UNEMPLOYED IN THEIR DRUG USE BEHAVIOR?

4.1 Introduction

I include unemployed youth in this analysis to obtain a more comprehensive understanding of why youth in the labor force use drugs. The relationship between drug use and workplace performance may be a two-way street: While workers may resort to drugs due to characteristics of the work setting, and specific jobs in particular, problems outside the workplace may contribute to increased drug use.

This chapter aims to assess the relationship between employment status and substance abuse in young adults. By looking at drinking and drug use at three points time among a sample of young people, the analysis in this chapter (1) investigates whether alcohol use, marijuana use, or cocaine use is associated with employment status and (2) attempts to determine the direction of any association found between alcohol consumption, drug use, and employment. More specifically, I examine the differences between employees and unemployed persons in their sociodemographic background and their substance use behaviors, and I attempt to identify the potential main net effects of employment status and interaction effects with other variables on different measures of substance use.

4.2 Variables

Alcohol and drug use variables examined in this chapter include prior-month alcohol use, prior-month marijuana use, and lifetime cocaine use. As the nature of the associations may be quite different for modest and heavy alcohol use,⁹ I further include one heavy alcohol use measure in the analyses. Heavy alcohol use was defined as a dummy variable indicating whether a respondent had had six or more drinks on one occasion in the prior 30 days.

4.3 Measure of Employment Status

The employment measures used in this study are consistent with standard definition of labor market status. I considered four such statuses—“employed,” “unemployed,” “out of labor force,” and “in active forces.” Only individuals in the first two categories were included in the analyses. Thus, unemployed persons do not include those who were out of labor force or who engaged in domestic work.¹⁰

4.4 Analysis

To describe patterns of alcohol and controlled drug use among employed and unemployed young adults, and to identify specific groups of employees with higher rates of alcohol and controlled drug use, I calculated estimates of alcohol, marijuana, and cocaine use at three different

⁹ Modest drinking may have short-term beneficial health and psychological effects and may act as a social catalyst (Turner et al., 1981; Baum-Baicker, 1985; White et al., 1988).

¹⁰ My preliminary analyses indicated that including unemployed persons with those who were out of labor force would generate quite different results than would considering each individually. The latter usually have low prevalence rates of substance abuse. To be consistent with the common standard of classification (SAMHSA, 1996), I listed unemployed persons as the only comparison group in the analyses.

time points (the 1984 wave, the 1988 wave, and the 1992 wave) by age, gender, and race. Respondents were classified into three age groups in the analysis. Group 1 contained those aged 19 to 21 in 1988, Group 2 contained respondents aged 22 to 24, and Group 3 contained respondents aged 25 to 27. Data analyses were conducted in three steps. First, descriptive statistics of demographic variables and alcohol and controlled drug use measures by employment status were calculated across the two groups. Chi-square tests were used to test the significance of the group differences. Second, the prevalence rates of alcohol and controlled drug use, as well as the percentage differences of employed versus unemployed by alcohol and controlled drug use, were examined by the selected demographic variables. Third, multiple logistic regression analyses were conducted to investigate the effects of the employment status on a variety of drug use measures, controlling the sociodemographic variables. The interaction effects of the employment status and the demographic variables were also explored.

4.5 Descriptive Results

4.5.1 Characteristics of Employed and Unemployed Persons

As shown in Table 4.1, for each of the three cohorts examined, the percentages of unemployed persons decreased over the three waves. In the 1984 wave, unemployed persons were more likely to be younger; there were no significant age structure differences between the employed and the unemployed, in both the 1988 and the 1992 wave, however. Few gender differences were found by employment status. Whites had the highest employment rates of the three racial groups.

Significantly more employed than unemployed persons were current drinkers in the 1984 wave; however, no significant differences were found between the two groups for this variable in the 1988 and 1992 waves. Across all three waves of data, unemployed persons were more likely to be current marijuana users (ranging from 27.1 percent in 1984 to 10.5 percent in 1992) than employed persons (ranging from 20.4 percent in 1984 to 6.8 percent in 1992). No significant differences were found between employed and unemployed persons on lifetime cocaine use.

Table 4.1. Demographic Characteristics and Alcohol and Drug Use, by Year and Employment Status

	1984				1988				1992 ¹				
	Employed		Unemployed		Employed		Unemployed		Employed		Unemployed		
	N ²	%	N	%	N	%	N	%	N	%	N	%	
DEMOGRAPHIC³													
Aged 19–21 (in 1984)	2210	29.2***	549	39.4***	2766	35.2	241	38.3	2411	36.0	231	38.4	
Aged 22–24 (in 1984)	2984	39.5	535	38.4	3051	38.8	242	38.4	2666	39.4	238	39.5	
Aged 25–27 (in 1984)	2368	31.3***	310	22.2***	2052	26.1	147	23.3	1668	24.6	133	22.1	
Gender: Male	4044	53.5	754	54.1	4253	54.1***	298	47.3***	3653	53.9	315	52.3	
Female	3518	46.5	640	45.9	3616	46.0***	332	52.7***	3122	46.1	287	47.7	
Race: White	5566	74.0***	730	52.6***	5575	71.2***	308	49.0***	4534	67.3***	311	51.8***	
Black	1568	20.8***	565	40.7***	1871	23.9***	283	45.1***	1832	27.2***	250	41.6***	
Other	384	5.1	93	6.7	380	4.9	37	5.9	371	5.5	40	6.7	
DRUG USE⁴													
Prior-Month Alcohol Use	<i>yes</i>	5521	76.1***	936	72.5***	5538	73.2	433	73.8	4257	67.3	365	65.5
	<i>no</i>	1731		356		2027		154		2065		192	
Prior-Month Heavy Alcohol Use	<i>yes</i>	3107	41.1	573	41.1	2973	37.8***	274	43.5***	3121	48.8***	242	42.7***
	<i>no</i>	4449		821		4896		356		3275		325	
Prior-Month Marijuana Use	<i>yes</i>	1534	20.4***	376	27.1***	920	11.9***	102	16.5***	452	6.8***	60	10.5***
	<i>no</i>	5986		1012		6794		517		6179		514	
Lifetime Cocaine Use	<i>yes</i>	1333	17.7	231	16.6	2173	28.2	181	29.2	1620	25.2	146	25.9
	<i>no</i>	6195		1162		5542		440		4817		418	

Notes: 1. Originally, there are 12686 respondents in the 1979 sample, 12069 respondents in the 1984 sample, 10465 respondents in the 1988 sample, and 9016 respondents in the 1992 sample. Here, the analyses are restricted to those who were employed or unemployed; those who were out of labor force and those who were in active forces are excluded; 2. Figures for the case numbers are actual numbers. These vary slightly for each comparison due to variation in missing information; 3. Percentages in the cells are the row percent; 4. percentages in the cells are the column percentages.

4.5.2 Drug Use by Sociodemographic Variables

Analysis of alcohol, marijuana, and cocaine use by age group, gender, and race reveal some patterns in the multi-wave data. These patterns are discussed by sociodemographic variable in the sections below.

4.5.2.1 Age

While about three-quarters of employed persons were current drinkers in both 1984 and 1988, alcohol prevalence rates increased with age in the 1984 wave. The percentage of workers using alcohol in the prior month was 73.6 in Group 1 (aged 19 to 21), 76.6 in Group 2 (aged 22 to 24), and 77.9 in Group 3 (aged 25 to 27). However, this association became negative in the 1988 wave data, with current alcohol use decreasing with age. The percentage using alcohol in the prior month was 74.0 in Group 1, 73.2 in Group 2, and 72.3 in Group 3. Current marijuana use in each of the three age groups declined about 10 percent from the 1984 wave to the 1988 wave.

4.5.2.2 Gender

The rates of current alcohol use, current heavy alcohol use, current marijuana use, and lifetime cocaine use were all significantly higher among males than among females. In 1984, the rate of current marijuana use was 34 percent for males, and only 19 percent for females. In 1988, the rate dropped significantly for both males and females, but the male–female difference for current marijuana use (20 percent vs. 14 percent) was still statistically significant.

4.5.2.3 Race

Current alcohol use among workers was highest for whites (79 percent in 1984, 75 percent in 1988) and lowest for blacks (68 percent in 1984, 67 percent in 1988). Among the unemployed, whites had the highest prevalence rate of current alcohol use in 1984, at 75 percent, while in 1988, blacks had the highest rate, at 77 percent. About 20 percent of white employees and 21 percent of black employees were current marijuana users in 1984. In 1988, about 13 percent of whites and 11 percent of blacks were current marijuana users.

4.5.3 *Substance Use Among the Employed and Unemployed Over Time*

Table 4.2 displays the calculated mean difference of substance use between employed and unemployed persons. As younger and male employees may perceive less of a distinction between their leisure-time activities and work (Hollinger, 1988), it was expected that the differences between the unemployed and the employed on substance use, if any, would be smaller in the younger group than in the older group, and in the male group than in the female group. This hypothesis was not supported directly. In the 1984 wave, this difference for prior-month marijuana use was -5.11 ($p < 0.01$) in Group 1 (aged 19–21), -5.97 ($p < 0.01$) in Group 3 (aged 24–26), and -8.31 ($p < 0.01$) in Group 2 (aged 22–24). However, when members within the same cohort aged by 4 years, the difference by employment status had diminished. In the 1988 wave, the employment and unemployment difference in prior-month marijuana use

Table 4.2. Percentage Differences Between Employed and Unemployed on Drug Use Behavior by Age, Race, and Gender*

	1984 Wave			1988 Wave		
	Group 1 (Age 19–21 in 1984)	Group 2 (Age 22–24 in 1984)	Group 3 (Age 25–27 in 1984)	Group 1 (Age 23–25 in 1988)	Group 2 (Age 26–28 in 1988)	Group 3 (Age 29–31 in 1988)
Prior-month alcohol use	73.59 <u>-72.58</u> 1.01	76.61 <u>-71.03</u> 5.58**	77.87 <u>74.70</u> 3.17	73.95 <u>75.45</u> -1.50	73.15 <u>73.54</u> -0.39	72.30 <u>71.43</u> 0.87
Prior-month heavy alcohol use	42.82 <u>-39.34</u> 3.48***	41.79 <u>-42.24</u> -0.45	38.68 <u>42.26</u> -3.58	41.03 <u>45.23</u> -4.20	38.97 <u>42.15</u> -3.18	31.63 <u>42.86</u> -11.23***
Prior-month marijuana use	21.45 <u>26.56</u> -5.11***	20.07 <u>-28.38</u> -8.31***	19.83 <u>25.80</u> -5.97***	13.27 <u>16.81</u> -2.94	11.75 <u>18.14</u> -6.39***	10.37 <u>13.19</u> -2.82
Lifetime cocaine use	14.33 <u>12.93</u> 1.40	18.15 <u>-18.50</u> -0.35	20.31 <u>19.70</u> 0.61	27.48 <u>27.08</u> 0.40	28.81 <u>32.35</u> -3.54	28.14 <u>27.27</u> 0.87
	Male		Female			
Prior-month alcohol use	81.74 <u>78.93</u> 2.81	69.58 <u>64.48</u> 5.1**	79.64 <u>80.07</u> -0.43	65.52 <u>67.57</u> -2.05		
Prior-month heavy alcohol use	46.61 <u>47.08</u> -0.47	27.02 <u>27.19</u> -0.17	50.48 <u>56.38</u> -5.90**	23.01 <u>22.49</u> 0.52		
Prior-month marijuana use	26.49 <u>33.95</u> -7.46***	13.41 <u>19.00</u> -5.59***	15.17 <u>19.73</u> -4.56**	8.13 <u>13.54</u> -5.41***		
Lifetime cocaine use	20.95 <u>19.50</u> 1.45	13.98 <u>13.15</u> 0.83	32.84 <u>32.88</u> -0.04	22.69 <u>25.77</u> -3.08		
	White	Black	Hispanic	White	Black	Hispanic
Prior-month alcohol use	78.59 <u>74.50</u> 4.09**	68.02 <u>70.95</u> -2.93	73.16 <u>67.07</u> 6.09 ^b	75.38 <u>72.57</u> 2.81	66.92 <u>76.60</u> -9.68***	72.02 <u>62.50</u> 9.52 ^b
Prior-month heavy alcohol use	45.15 <u>49.04</u> -3.89**	28.32 <u>30.62</u> -2.30	35.77 <u>44.07</u> -8.30 ^b	40.39 <u>45.13</u> -4.74	29.82 <u>42.05</u> -12.23***	39.47 <u>43.24</u> -3.77 ^b
Prior-month marijuana use	20.28 <u>26.65</u> -6.37***	21.40 <u>27.40</u> -6.00***	18.54 <u>29.35</u> -10.81 ^b	12.53 <u>16.00</u> -3.47*	10.51 <u>17.50</u> -6.99***	11.14 <u>10.81</u> 0.33 ^b
Lifetime cocaine use	19.96 <u>20.30</u> -0.34	9.86 <u>11.86</u> -2.00	17.63 <u>17.20</u> 0.43 ^b	31.29 <u>31.56</u> -0.27	18.85 <u>25.27</u> -6.42*	29.51 <u>37.84</u> -8.33 ^b

Notes: *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

a Cell content refers to (% employed persons who used drugs)–(% unemployed persons who used drugs) = percentage difference

b Due to small numbers of nonemployed Hispanics, the significance test results of comparing employed and unemployed Hispanics were suppressed.

data were controlled for gender, this difference reduction was still seen in the empirical results; for example, among male prior-month marijuana users, the difference was reduced from -7.46 ($p < 0.01$) in the 1984 wave to -4.56 ($p < 0.01$) in the 1988 wave.

Workers were generally more likely to be current drinkers and less likely to be current marijuana users than unemployed persons. This finding is consistent with prior analyses from the NHSDA (National Household Survey on Drug Abuse). The results from this study further demonstrate that the differences between the employed and unemployed differ across racial groups with regard to substance use, though in unstable patterns over time. With regard to current marijuana use, for example, the above-mentioned difference was more obvious for whites in the 1984 wave, but in 1988, employed and unemployed whites did not differ in their substance use behavior. However, we found large and significant substance use differences between employed and unemployed blacks, with employed blacks being less likely to use on all measures of drugs.

4.6 Logistic Regression Results

In an effort to examine the multivariate relationship between alcohol and drug use and worker demographics, I estimated logit models for tendency to use alcohol and drugs.

4.6.1 Current Alcohol Use

Since “prior-month alcohol use” was a dummy variable, logistic regression was used. The dependent variable here was not a probability, but rather a logarithm of the odds of two probabilities. Table 4.3 presents the multiple logistic regression results of prior-month alcohol use for both employed and unemployed persons. The table generally shows that among the

Table 4.3. Logistic Regression Coefficients and Odds Ratio of the Main Effects and Interaction Effects of Employment Status on Current Alcohol Use

	1984			1988			1992		
	Parameter Estimates ^a	Odds Ratio	Confidence Interval ^b	Parameter Estimates	Odds Ratio	Confidence Interval	Parameter Estimates	Odds Ratio	Confidence Interval
Intercept	1.422***	.	.	1.432***	.	.	1.267***	.	.
AGE1719 ^c	-0.063	0.94	[0.71, 1.25]	-0.144	0.87	[0.56, 1.34]	-0.252	0.78	[0.52, 1.17]
AGE2022 ^c	0.122	1.13	[0.81, 1.58]	-0.186	0.83	[0.51, 1.35]	-0.424*	0.65	[0.41, 1.06]
BLACK	-0.165	0.85	[0.65, 1.10]	0.202	1.22	[0.83, 1.81]	-0.020	0.98	[0.67, 1.43]
HISPANIC	-0.359	0.70	[0.42, 1.15]	-0.506	0.60	[0.28, 1.31]	-0.492	0.61	[0.30, 1.25]
FEMALE	-0.732	0.48	[0.38, 0.62]	-0.649***	0.52	[0.36, 0.77]	-0.754***	0.47	[0.33, 0.67]
EMPLOY(I)	0.093	1.10	[0.82, 1.47]	0.082	1.09	[0.70, 1.68]	-0.019	0.98	[0.65, 1.48]
E(I)*FEMALE ^d	0.042	1.04	[0.79, 1.37]	-0.080	0.92	[0.62, 1.37]	0.048	1.05	[0.72, 1.53]
E(I)*AGE1719	0.239	1.27	[0.93, 1.73]	0.120	1.13	[0.72, 1.77]	0.208	1.23	[0.80, 1.89]
E(I)*AGE2022	0.112	1.12	[0.78, 1.61]	0.112	1.12	[0.68, 1.85]	0.364	1.44	[0.87, 2.37]
E(I)*BLACK	-0.406	0.67	[0.50, 0.89]	-0.625***	0.54	[0.36, 0.80]	-0.471***	0.62	[0.42, 0.93]
E(I)*HISPANIC	0.041	1.04	[0.60, 1.82]	0.299	1.35	[0.60, 3.04]	0.303	1.35	[0.64, 2.88]
-2 Log Likelihood	9152.68			9153.88			8404.16		

Notes: *: 0.10 level, **: 0.05 level, ***: 0.01 level.

a. Significance Test for $H_0 = 0$ for the Wald Chi-square statistics associated with the parameters.

b. Wald Confidence Limits of the Odds Ratio.

c. AGE1719 refers to respondents who were ages 17 to 19 in 1979, AGE2022 refers to respondents who were ages 20 to 22 in 1979.

The reference group is AGE1416.

d. I = 84 for the year 1984, I = 88 for the year 1988, I = 92 for the year 1992.

variables included, gender was the dominant predictor of alcohol use. Females were consistently less likely to use alcohol in the prior 30 days than males, with an odds ratio of 0.48 in the 1984 wave, 0.52 in the 1988 wave, and 0.47 in the 1992 wave.¹¹ Employed persons were not found to be significantly different from unemployed persons in their prior-month alcohol use in each of the three waves of data. Though blacks did not differ significantly from whites in their prior-month alcohol use (after controlling for other variables), it should be noted that the interaction terms for blacks and employment status were significant in all three waves. The logistical parameter in the 1984 wave model was negative (-0.406, $p < 0.01$), and the odds ratio was less than 1 (0.67, with the 95-percent confidence interval ranging from 0.50 to 0.89). This pattern held true for each of the three waves. This finding suggests that black employees are significantly less likely than white employees to have used alcohol in the prior month.

4.6.2 Current Heavy Alcohol Use

The heavy-drinking measure was then used as the dependent variable in my model, with the rationale that unemployment may help create a hazardous pattern of binge drinking, without a concomitant change in the overall amount consumed. Table 4.4 presents the logistic regression coefficients and odds ratios of the main effects and the interaction effects of employment status on respondents' heavy alcohol use in the prior 30 days, controlling for age, gender, and race.

Respondents' employment status was found not to be associated with the current heavy alcohol use. Black employees were found to be significantly less likely than white employees to have six

¹¹ The odds ratio is the number by which we would multiply the odds of being an alcohol user (the probability, which is divided by 1 minus the probability) for each one-unit increase in the independent variable. An odds ratio greater than 1 indicates that the odds of being an alcohol user increase when the independent variable increases; and an odds ratio of less than 1 indicates that the odds of being an alcohol user decrease when the independent variable increases.

Table 4.4. Logistic Regression Coefficients and Odds Ratio of the Main Effects and Interaction Effects of Employment Status on Current Heavy Alcohol Use

	1984			1988			1992		
	Parameter Estimates ^a	Odds Ratio	Confidence Interval ^b	Parameter Estimates	Odds Ratio	Confidence Interval	Parameter Estimates	Odds Ratio	Confidence Interval
Intercept	0.356***	.	.	0.403**	.	.	0.051	.	.
AGE1719 ^c	0.171	1.19	[0.92, 1.53]	-0.161	0.85	[0.59, 1.24]	-0.275	0.76	[0.52, 1.11]
AGE2022 ^c	0.135	1.15	[0.85, 1.54]	-0.037	0.96	[0.63, 1.48]	-0.383*	0.68	[0.43, 1.07]
BLACK	-0.798***	0.45	[0.35, 0.57]	-0.147	0.86	[0.62, 1.21]	-0.259	0.77	[0.54, 1.10]
HISPANIC	-0.163	0.85	[0.54, 1.33]	-0.072	0.93	[0.46, 1.90]	-0.179	0.84	[0.42, 1.67]
FEMALE	-1.125***	0.33	[0.26, 0.41]	-1.018***	0.36	[0.26, 0.50]	-0.070	0.93	[0.67, 1.31]
EMPLOY(I)	0.057	1.06	[0.83, 1.36]	-0.126	0.88	[0.61, 1.27]	0.038	1.04	[0.72, 1.49]
E(I)*FEMALE ^d	-0.041	0.96	[0.75, 1.23]	-0.227	0.80	[0.57, 1.12]	0.047	1.05	[0.74, 1.49]
E(I)*AGE1719	-0.202	0.82	[0.62, 1.08]	0.091	1.10	[0.74, 1.62]	0.217	1.24	[0.84, 1.85]
E(I)*AGE2022	-0.351	0.70	[0.51, 0.97]	-0.383*	0.68	[0.44, 1.07]	0.316	1.37	[0.86, 2.20]
E(I)*BLACK	-0.009	0.99	[0.76, 1.30]	-0.361**	0.70	[0.49, 1.00]	-0.081	0.92	[0.64, 1.33]
E(I)*HISPANIC	-0.285	0.75	[0.45, 1.25]	-0.008	0.99	[0.47, 2.09]	0.166	1.18	[0.57, 2.43]
-2 Log Likelihood	11184.28			10434.89			9594.34		

Notes: *: 0.10 level, **: 0.05 level, ***: 0.01 level.

a. Significance test for $H_0 = 0$ for the Wald Chi-square statistics associated with the parameters.

b. Wald Confidence Limits of the Odds Ratio.

c. AGE1719 refers to respondents who were ages 17 to 19 in 1979, AGE2022 refers to respondents who were ages 20 to 22 in 1979. The reference group is AGE1416.

d. I = 84 for the year 1984, I=88 for the year 1988, I = 92 for the year 1992.

or more drinks on a single occasion. Though the parameters were negative, this negative relationship was significant only in the early wave (1984) model. When respondents aged from early youth to adults, the white–black difference in heavy drinking decreased. In the 1992 wave, members of Group 3 (who were now aged 33 to 35) were less likely to be heavy alcohol users than members of Group (now aged 29 to 31) (odds ratio = 0.68). In addition, the results again showed that across all three waves, gender effects were important, with females consistently less likely to be heavy drinkers.

4.6.3 Current Marijuana Use

Table 4.5 displays the odds ratios of the main effects and interaction effects of employment status on current marijuana use. In both 1984 and 1988, workers were not found to be significantly different from unemployed persons in their prior-month marijuana use. In 1992, however, those who were employed were much less likely to be the current marijuana users than those who were not employed (odd ratio = 0.42). Stated another way, unemployed persons were approximately 2.38 (1/0.42) more likely to use marijuana than employed persons. With regard to race, while blacks were less likely than whites to use marijuana in the prior month (odd ratio = 0.36), in the 1992 wave, being black increased a worker’s odds of being a current marijuana user by 1.97. Finally, females were less likely than males to be current marijuana users in all three waves of data collection.

4.6.4 Lifetime Cocaine Use

Table 4.6 presents the logistic regression results modeling lifetime cocaine use. We found no evidence to support the proposition that employed and unemployed persons differ significantly with regard to lifetime cocaine use. Results also confirmed that blacks and females

Table 4.5. Logistic Regression Coefficients and Odds Ratio for Main Effects and Interaction Effects of Employment Status on Current Marijuana Use

	1984			1988			1992		
	Parameter Estimates ^a	Odds Ratio	Confidence Interval ^b	Parameter Estimates	Odds Ratio	Confidence Interval	Parameter Estimates	Odds Ratio	Confidence Interval
Intercept	-0.739	.	.	-1.392**	.	.	-1.281	.	.
AGE1719 ^c	0.119	1.13	[0.86, 1.48]	0.049	1.05	[0.65, 1.70]	-0.363	0.70	[0.38, 1.27]
AGE2022 ^c	-0.016	0.98	[0.71, 1.36]	-0.279	0.76	[0.42, 1.37]	-0.702*	0.50	[0.23, 1.09]
BLACK	0.063	1.07	[0.83, 1.37]	0.094	1.10	[0.71, 1.70]	-1.011***	0.36	[0.19, 0.69]
HISPANIC	0.173	1.19	[0.73, 1.93]	-0.488	0.61	[0.21, 1.82]	-0.636	0.53	[0.15, 1.82]
FEMALE	-0.792***	0.45	[0.35, 0.58]	-0.451**	0.64	[0.41, 0.98]	-0.512*	0.60	[0.34, 1.05]
EMPLOY(I)	-0.218	0.80	[0.61, 1.05]	-0.156	0.86	[0.53, 1.37]	-0.871***	0.42	[0.25, 0.70]
E(I)*FEMALE ^d	-0.055	0.95	[0.72, 1.25]	-0.252	0.78	[0.49, 1.23]	-0.266	0.77	[0.42, 1.39]
E(I)*AGE1719	-0.201	0.82	[0.60, 1.11]	-0.179	0.84	[0.51, 1.39]	0.342	1.41	[0.74, 2.67]
E(I)*AGE2022	-0.092	0.91	[0.64, 1.30]	0.007	1.01	[0.54, 1.88]	0.389	1.48	[0.64, 3.39]
E(I)*BLACK	-0.0004	1.00	[0.75, 1.33]	-0.292	0.75	[0.47, 1.20]	0.677*	1.97	[1.00, 3.87]
E(I)*HISPANIC	-0.307	0.74	[0.42, 1.28]	0.331	1.39	[0.46, 4.35]	0.365	1.44	[0.39, 5.37]
-2 Log Likelihood	8934.87			6058.46			3566.88		

Notes: *: 0.10 level, **: 0.05 level, ***: 0.01 level.

a. Significance Test for $H_0 = 0$ for the Wald Chi-square statistics associated with the parameters,

b. Wald Confidence Limits of the Odds Ratio.

c. AGE1719 refers to respondents who were ages 17 to 19 in 1979, AGE2022 refers to respondents who were ages 20 to 22 in 1979.

The reference group is AGE1416.

d. I = 84 for the year 1984, I=88 for the year 1988, I = 92 for the year 1992.

Table 4.6. Logistic Regression Coefficients and Odds Ratio for Main Effects and Interaction Effects of Employment Status on Lifetime Cocaine Use

	1984			1988			1992		
	Parameter Estimates ^a	Odds Ratio	Confidence Interval ^b	Parameter Estimates	Odds Ratio	Confidence Interval	Parameter Estimates	Odds Ratio	Confidence Interval
Intercept	-1.480***	.	.	-0.696***	.	.	-0.513***	.	.
AGE1719 ^c	0.446***	1.56	[1.12, 2.18]	0.249	1.28	[0.86, 1.91]	0.112	1.12	[0.72, 1.73]
AGE2022 ^c	0.497**	1.64	[1.13, 2.40]	0.042	1.04	[0.65, 1.67]	-0.007	0.99	[0.59, 1.68]
BLACK	-0.063***	0.54	[0.39, 0.73]	-0.329*	0.72	[0.50, 1.04]	-1.036***	0.36	[0.23, 0.55]
HISPANIC	-0.145	0.87	[0.49, 1.54]	0.278	1.32	[0.65, 2.70]	-0.371	0.69	[0.32, 1.48]
FEMALE	-0.462***	0.63	[0.47, 0.84]	-0.350*	0.71	[0.49, 1.00]	-0.419**	0.66	[0.45, 0.97]
EMPLOY(I)	0.044	1.05	[0.76, 1.45]	0.095	1.10	[0.75, 1.62]	-0.138	0.87	[0.59, 1.30]
E(I)*FEMALE ^d	-0.029	0.97	[0.70, 1.34]	-0.163	0.85	[0.59, 1.23]	-0.069	0.93	[0.62, 1.40]
E(I)*AGE1719	-0.143	0.87	[0.60, 1.25]	-0.173	0.84	[0.56, 1.27]	-0.176	0.84	[0.53, 1.33]
E(I)*AGE2022	-0.080	0.92	[0.61, 1.39]	-0.013	0.99	[0.60, 1.61]	-0.103	0.90	[0.52, 1.56]
E(I)*BLACK	-0.207	0.81	[0.57, 1.17]	-0.347*	0.71	[0.48, 1.04]	0.298	1.35	[0.85, 2.13]
E(I)*HISPANIC	-0.004	1.00	[0.53, 1.88]	-0.368	0.69	[0.33, 1.47]	0.258	1.29	[0.58, 2.89]
-2 Log Likelihood	8020.82			9655.42			7660.75		

Note: *: 0.10 level, **: 0.05 level, ***: 0.01 level.

a. Significance Test for $H_0 = 0$ for the Wald Chi-square statistics associated with the parameters.

b. Wald Confidence Limits of the Odds Ratio.

c. AGE1719 refers to respondents who were ages 17 to 19 in 1979, AGE2022 refers to respondents who were ages 20 to 22 in 1979
The reference group is AGE1416.

d. I = 84 for the year 1984, I=88 for the year 1988, I = 92 for the year 1992.

were less likely to use cocaine in their lifetimes than whites and males, respectively. Parameters for the age variables were significant in 1984 (odds ratio = 1.56 for Group 2 and 1.64 for Group 3), but no significant age effects were observed in 1988 and 1992. Therefore, Group 1 was less likely to use cocaine in 1984, but as they aged, the difference between Group 1 and Groups 2 and 3 diminished.

4.7 Summary and Discussion

A summary of the hypotheses testing results and the highlights of the findings is presented in Table 4.7. After controlling for age, gender, and race, employees across all three waves were not found to be significantly different from the unemployed for either prior-month alcohol use or prior-month heavy alcohol use. While perhaps surprising, this result is consistent with earlier findings in the research. For example, in 1982, Benham and Benham initially found that alcoholics had lower employment rates; however, when they controlled for other variables in their regression analysis, they found no significant relationship between employment and problem drinking.

With regard to marijuana use, my data indicated that in the first two waves of data collection, workers in all three age groups were not significantly different from the unemployed in the prior-month marijuana use. However, when these young people entered early adulthood (aged 27–35 in the 1992 wave), unemployed persons were more than two times as likely to use marijuana than employed persons, holding all other variables equal. This finding suggests that data

from previous studies which used cross-sectional data to conclude that unemployment status

Table 4.7. A Summary of Hypotheses Testing Status and Highlights of Findings

Hypotheses Proposed in Chapter 2	Hypotheses Testing—Supported?	Highlights of Findings
<i>Bivariate:</i>		
Casual Alcohol Use		<ul style="list-style-type: none"> Higher prevalence rates of current alcohol use are found among the employed persons in the 1984 wave.
H4.1	Mixed	
Heavy Alcohol Use		<ul style="list-style-type: none"> In the 1988 wave, higher prevalence rates of current heavy drinkers are found among the unemployed persons. In the 1992 wave, higher prevalence rates of current heavy drinkers are found among the employed persons.
H4.2	Mixed	
Current Marijuana Use		<ul style="list-style-type: none"> Throughout all the three waves (1984, 1988, 1992), those employed workers are significantly less likely than the unemployed persons to use marijuana in the prior month.
H4.3	Yes	
Lifetime Cocaine Use		<ul style="list-style-type: none"> Throughout all the three waves (1984, 1988, 1992), those employed workers are not significantly different from the unemployed persons in their life time cocaine use behavior.
H4.4	No	
<i>Multivariate:</i>		
Casual Alcohol Use		<ul style="list-style-type: none"> After controlling for age, gender, and race, employed workers across all three waves are not found to be significantly different from the unemployed persons regarding the prior-month alcohol use.
H4.1	No	
Heavy Alcohol Use		<ul style="list-style-type: none"> After controlling for age, gender, and race, employed workers across all three waves (1984, 1988, 1992) are not found to be significantly different from the unemployed persons regarding prior-month heavy alcohol use.
H4.2	No	
Current Marijuana Use		<ul style="list-style-type: none"> Regardless of their age, race, and gender, in the first two waves (1984, 1988) data, employed workers are not significantly different from the unemployed persons with regard to their prior month marijuana use behavior; in the third wave (1992), however, unemployed persons are more than two times as likely to use marijuana in the prior month than the employed workers.
H4.3	Mixed	
Lifetime Cocaine Use		<ul style="list-style-type: none"> Across all three waves (1984, 1988, 1992) data, the employed workers and the unemployed persons are not significantly different in their lifetime cocaine use behavior.
H4.4	No	

Source: National Longitudinal Survey of Youth, 1979-1993

and drug use are unrelated (e.g., Bachman et al., 1984; White, Aidala, & Zablocki, 1988) should be judged in the context of a life course perspective.

Knowledge of the social and demographic correlates of high alcohol consumption or problem drinking in the workplace may be important in developing appropriate work-based programs, since it can help both in the identification of workers who are at risk for experiencing problems with alcohol and in developing effective treatment programs.

Previous studies examining the role of age have been contradictory, with some studies reporting that youthfulness is related to problem drinking (Shain & Groeneveld, 1980; Hingson et al., 1981), and others finding that problem drinking is more common among middle-age (Trice, 1965; Archer, 1977) and older adults (Warkhov et al., 1965). My findings here demonstrate the differences in the fluctuation of alcohol and marijuana use, with alcohol use increasing and marijuana use decreasing with age. The findings here also indicate that when age, gender, and race are controlled, few significant effects are found for employment status on alcohol and marijuana use.

CHAPTER V. THE ASSOCIATION BETWEEN JOB CHARACTERISTICS AND DRUG USE: TESTING IMPORTATION THEORY AND WORK-RELATED STRAIN THEORY

5.1 Introduction

In this Chapter, I investigate the potential association between workers' perceived job characteristics and their alcohol abuse and controlled drug use behavior. Some common shortcoming of studies in this area are: 1. lack of adequate controls which may yield misleading results—many researchers tend to investigate either social demographic variables or organizational variables without efforts of incorporate these two sets of variables; 2. Inappropriate analytic means -- less sophisticated statistical tools were used; 3. inflated generalizability—attempt was made to generalize to the national population when only one organization sample was used.

I introduce both sociodemographic variables and workplace related variables in the model. I also investigate additional measures on extent of consumption which are closer to the actual substance use variance in reality than simple measures which are convenient for analytic purposes. I adopt a contingency perspective and assume that the use pattern may vary depending on which measures are used especially whether it is alcohol or drug use. I explicitly examine the difference between men and women workers in their substance use pattern in the context of workplace. I utilize more sophisticated statistical tools whenever appropriate such as Poisson regression and negative binomial regression. Finally, I use a large national sample of survey of labor market experience of youth, which has been proved to be representative at the national level.

5.2 Variables

5.2.1 Dependent Variables

A variety of measures on employees' alcohol and drug use are modeled as the dependent variables. These include consumption, ever used or not, and number of occasions of use.

AFQ88: Alcohol frequency/quantity: 0: no drink in the prior month, 1: drank in the prior month but no heavy drink, 2: one occasion of heavy drinking in the prior month, 3: two to six occasions of having heavy drinking in the prior month.

DK6MRE88: Whether the employee had 6 or more drinks at one time in the prior 30 days.

MJMON88: Whether the employee used marijuana or hashish in the prior month.

MJYR88: Whether the employee used marijuana or hashish in the prior year.

COFLAG88: Whether the employee used cocaine in the lifetime.

MJOC88: Occasions used marijuana in the prior month.

*COOC88*¹²: Occasions used cocaine in the prior 30 days.

Based on the measurement scales of the variables, ordinary least square regression, logistic regression, Poisson regression, and negative binomial regression are implemented. In the Poisson regression analyses that follow, the dependent variable is the number of occasions of using

¹² In your lifetime, on how many occasions have you used marijuana or hashish? 0–never, 1– 1 to 2 occasions, 2: 3 to 9 occasions, 3: 10 to 39 occasions, 4: 40 to 99 occasions, 5: 100 or more occasions.

marijuana or cocaine of individual i in period t , where periods here are readily defined as the prior 30 days (as is used in the survey questionnaire).

5.2.2 Independent Variables

Independent variables include number of years being employed, occupational category dummy variable, job mobility, overall job satisfaction, perceived job characteristics such as promotion, pay, and security, physical work environment, and self-esteem. To control for sociodemographic confounding effects the model specification also includes age, race, marital status, education, and father's education.

In the 1987 survey of NLSY, 10 items of the Rosenberg self-esteem measure¹³ were administered. These measures represent individual answers to 10 specific questions about respondents' self-worth evaluation. Each item was scored on a scale ranging from 1 (strongly agree) to 4 (strongly disagree). Five of the 10 items were positively worded (e.g., "I am a person of worth"; "I have a number of good qualities") and the other five of the 10 items were negatively worded (e.g., "I feel I do not have much to be proud of"; "I certainly feel useless at times"). In this study, the five positively worded items are recoded on a scale ranging from 1 (strongly disagree) to 4 (strongly agree). The 10 items are thereafter summed so that a high score indicates higher levels of self-esteem. I allow a one year time lag between observations of self-esteem and substance use behavior since a concurrent measurement may be not appropriate to test if youth with poor self-esteem would be involved in substance abuse. The reliability test indicates an alpha coefficient of .83 for this subsample with all employees. Marital status is categorized in the NLSY

¹³ Self-esteem was based on responses to the widely used 10 item Rosenberg self-esteem scale (Rosenberg 1965) and was measured at two time points—1980 and 1987 in NLSY. The reliability, and convergent and discriminant validity of this scale has been tested as acceptable (e.g., Blaskovich and Tomaka 1991:121–123).

as married, widowed, divorced, and never married. In the present study, marital status (MARRY88) is defined as married or not married. Education (HGC88) is operationalized by the “highest grade completed as of 1988.” To examine the effect of employees’ family background on employees’ substance use, employees’ fathers’ highest grade completed (HGFATHER), as measured in the 1979 wave, is included. Race is recoded into two dummy variables – “BLACK” and “HISPANIC,” with value 1 indicating blacks and Hispanics, respectively, for BLACK and HISPANIC. Therefore, when both variables were included in the logistics model the reference group would be whites. Sex is recoded as a dummy variable FEMALE with value 1 indicating females and 0 for males. Job stress is measured by the extent employees were dissatisfied with their current job. Respondents were asked: “How do you feel about the job you have now? Do you like it very much, like it fairly well, dislike it somewhat, or dislike it very much?” This measurement of the extent of labor alienation (DISSATIS) is included as one independent variable. Employees’ job experience (JOBEXPE) is measured by the number of years that he/she had been employed (not necessarily for the same employer). Employees’ job mobility (JOBMOB88) is measured by the number of times that he/she had changed jobs as of the survey year 1988. Three variables measuring the physical working conditions of the workplace are included as the independent variables. They are: JSSURR—“the physical surroundings are pleasant,” JSDANG—“the job is dangerous,” and JSUNHE—“exposed to unhealthy conditions.” The responses to these variables were coded ranging from 1—not true at all to 4—very true. Therefore, higher scores on these variables indicate a higher level of perceptions of “pleasant surrounding,” “dangerous job,” and “unhealthy conditions.” Three variables representing the attractiveness and security of the job are among the independent variables, namely:

JSPROM—“the chances for promotion are good;” JSPAY—“the pay is good;” and JSSECU—“the job security is good.” The coding schemes are the same as the above three workplace environment variables.

5.3 Analysis

Some cross-tabulated comparisons of employment status and several different measures of alcohol and controlled drug use are undertaken in order to establish baseline relationships which can be compared to the multivariate regression results. Then using OLS and logistic regression, I examine how these baseline relationships are affected by a consideration of relevant exogenous covariates. The last step is to conduct further investigations using Poisson regression and negative binomial regression models.

5.4 Results

The analytic sample of this study focuses on the 1988 wave respondents whose age range from 23 through 31. I started the pre-modeling analyses by summarizing the descriptive statistics of selected variables in the model specification by drug use behavior and by sex. The results are presented in Table 5.1.

Table 5.1. Descriptive Statistics of Selected Variables by Drug Use Behavior and by Sex

	Prior-month Alcohol Use				Prior-month Marijuana Use			
	Male		Female		Male		Female	
	User	Non -User	User	Non-User	User	Non-User	User	Non-User
AGE	26.53 (2.27)	26.67 (2.26)	26.64 (2.27)	26.63 (2.23)	26.26 (2.29)	26.59 (2.26)	26.36 (2.22)	26.62 (2.26)
-WHITE	81.1%	18.9%	70.0%	30.0%	16.2%	83.8%	9.1%	90.9%
-BLACK	77.8%	22.1%	55.4%	44.6%	14.3%	85.7%	6.9%	93.1%
-HISPANIC	82.3%	17.8%	62.4%	37.6%	15.6%	84.4%	4.8%	95.2%
-MARRIED	76.7%	23.3%	74.0%	26.0%	11.5%	88.5%	6.0%	94.0%
-OTHER	83.4%	16.5%	58.6%	41.4%	19.2%	80.8%	10.6%	89.4%
HGC88	12.64 (2.42)	12.24 (2.35)	13.21 (2.15)	12.71 (2.03)	12.12 (2.09)	12.62 (2.45)	12.79 (2.09)	13.01 (2.14)
HGFATHER	11.08 (4.01)	10.42 (3.89)	11.68 (3.67)	10.62 (3.73)	11.45 (3.65)	10.80 (4.06)	11.44 (3.43)	11.14 (3.84)
JOBEXYR	7.10 (2.29)	6.91 (2.38)	7.02 (2.40)	6.50 (2.59)	6.84 (2.38)	7.09 (2.30)	6.75 (2.42)	6.80 (2.50)
-MANUAL	80.0%	20.0%	66.5%	33.5%	16.2%	83.8%	7.4%	92.6%
-OTHER	80.8%	19.2%	66.3%	33.7%	15.1%	84.9%	8.6%	91.4%
JOBMOB88	7.62 (4.24)	7.58 (4.45)	7.29 (3.98)	6.43 (3.70)	8.74 (4.42)	7.38 (4.22)	8.57 (4.31)	6.75 (3.83)
DISSATIS	3.25 (0.71)	3.25 (0.72)	3.28 (0.73)	3.26 (0.76)	3.25 (0.71)	3.25 (0.71)	3.31 (0.71)	3.27 (0.74)
JS88DANG	2.18 (1.08)	2.28 (1.10)	1.56 (0.86)	1.61 (0.93)	2.31 (1.07)	2.18 (1.09)	1.58 (0.81)	1.59 (0.90)
JS88PAY	3.02 (0.82)	3.03 (0.79)	2.89 (0.85)	2.83 (0.92)	2.93 (0.84)	3.04 (0.81)	2.82 (0.88)	2.87 (0.86)
JS88PROM	2.91 (0.98)	2.86 (1.00)	2.71 (1.04)	2.64 (1.06)	2.72 (1.02)	2.93 (0.97)	2.72 (1.05)	2.68 (1.05)
JS88SECU	3.11 (0.88)	3.05 (0.91)	3.18 (0.88)	3.12 (0.93)	2.97 (0.93)	3.12 (0.88)	3.17 (0.91)	3.14 (0.91)
JS88SURR	3.18 (0.80)	3.18 (0.82)	3.34 (0.77)	3.34 (0.77)	3.09 (0.84)	3.20 (0.80)	3.37 (0.77)	3.33 (0.77)
JS88UNHE	1.89 (1.00)	1.88 (0.99)	1.57 (0.90)	1.63 (0.95)	1.99 (1.05)	1.87 (0.99)	1.50 (0.83)	1.59 (0.92)
SE87	33.62 (4.09)	33.35 (4.24)	33.73 (4.12)	33.34 (4.03)	33.06 (3.95)	33.63 (4.16)	33.01 (4.09)	33.56 (4.10)

Note: Percentages were calculated for nominal variables. Means and standard deviations were calculated for continuous and ordinal variables . Standard deviations for the means are in parentheses.

Of all employees included in the sample, the average ages of current alcohol users and current marijuana users are relatively lower than the average ages of non-users of alcohol and non-users of marijuana. While 81 percent of white male workers had alcohol in the prior month, 77 percent of black male workers did; 70 percent of white female workers had alcohol in the prior month but only 55 percent of black female workers drank in the prior month. With regard to current marijuana use, the user prevalence range is from about 16 percent for white male workers to 7 percent for black female workers. Current drinkers have higher average educational level (12.6 for male workers, and 13.1 for female workers) than non-drinkers (12.2 for males, and 12.7 for females). In contrast, current marijuana users have lower average educational level (12.1 for male workers, 12.8 for female workers) than non-current-users (12.6 for males, 13.0 for females). On average, users of either alcohol or marijuana have higher level of job mobilities. It was interesting to note that employees who were current drinkers possessed higher levels of self-esteem (33.6 for male workers and 33.7 for female workers) than those workers who are not current drinkers (33.4 for males and 33.3 for females). In contrast, current marijuana users have lower average levels of self-esteem (33.1 for male workers and 33.0 for female workers) than non-current users of marijuana (33.6 for male workers and 33.6 for female workers). This association appears to be similar for both the educational and self-esteem levels. There might be a confounding effect there since individuals with a higher educational level are usually known as having higher level of self-esteem also. It was thus interesting to examine the net effect of each of these variables while all the other variables were later statistically controlled.

Table 5.2. OLS Regression Modeling of Frequencies of Alcohol Use in the Prior 30 Days—Young Labor Force Participants (Age 23–31) in 1988

	Male		Female	
	Unstandardized Parameter	Standard Error	Unstandardized Parameter	Standard Error
Intercept	3.862***	0.487	1.804***	0.372
AGE	-0.029*	0.017	-0.021	0.013
BLACK	-0.364***	0.094	-0.401***	0.072
HISPANIC	-0.021	0.175	-0.161	0.140
MARRY88	-0.633***	0.076	-0.613***	0.056
HGC88	-0.093***	0.018	-0.056***	0.015
HGFATHER	0.030***	0.010	0.026***	0.008
JOBEXYR	0.027	0.018	0.025**	0.012
MANUAL	0.169**	0.078	0.078	0.065
JOBMOB88	0.010	0.009	0.024***	0.007
DISSATIS	0.080	0.061	0.008	0.044
JS88DANG	0.042	0.042	0.072	0.038
JS88PAY	-0.023	0.051	-0.050	0.036
JS88PROM	-0.021	0.043	0.005	0.029
JS88SECU	-0.007	0.047	0.048	0.035
JS88SURR	-0.019	0.052	-0.053	0.041
JS88UNHE	0.015	0.044	-0.060	0.037
SE87	-0.014	0.009	0.010	0.007
N	2822		2390	
R ²	0.052		0.083	

Note: *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

OLS regression was then used to test the relationships between a variety of variables and the amount of alcohol used by male and female employees.¹⁴ As shown in Table 5.2, with regard to the employees' frequencies of alcohol use in the prior month, no significant effects were found from the organizational facets such as the job pay, future promotion, job security, or physical environment quality. Male employees who engage in manual type of work are found to be significantly more likely ($b = 0.169$, $p < 0.05$) to use alcohol more frequently than male workers who do not engage in manual work as hypothesized. While this occupational distinction did not hold for female employees, females employees who changed jobs more frequently before are more likely to be current frequent drinkers than female employees who changed jobs less. For both male employees and female employees, higher educational background is associated negatively with frequencies of alcohol use (male: $b = -0.093$, $p < 0.01$; female: $b = -0.056$, $p < 0.01$). Employees' fathers' educational level, however, is found to be positively associated with both male and female employees' frequencies of current alcohol use. Racial and marital status are the other two important variables that showed significant effects on employees' current frequencies of drinking. Basically, black employees, and married employees are less likely to be frequent drinkers than white employees and single employees respectively. Overall, the variances explained by the set of variables included in the model are 5.2 percent for the male employee model and 8.3 percent for the female employee model, suggesting that the model fit the female employees slightly better.

¹⁴Although this created dependent variable was categorical in nature, the number of levels was 7, which was not too small, and histogram graph indicated that it was approximately normal distributed. Therefore, the assumption was made that its underlying properties were continuous. With regard to other binary or count measures in the subsequent models, regression models with binomial or Poisson distributions were used.

Table 5.3 presents the logistic regression results on employees' heavy drinking behavior. All but two of the work-related variables did not show any significant effects on female employees' heavy drinking behavior. These two exceptional variables are job experience and job mobility. After age, race, and education were controlled, female employees with more years of work history were more likely than female employees with less years of work history to be current heavy drinkers. Also, among female employees, the likelihood to be current heavy drinkers is higher for those who changed job more often than those who changed less often. For both males and females employees, being younger, black, or married, or having less education decreases the tendency to engage in heavy drinking. Generally, the effects of race, marital status, and education level are stronger for female employees than for male employees. For example, being married reduced the odds of being a heavy drinker by 0.46 for male employees but being married reduced the odds of being a heavy drinker by .58 for female employees.

Table 5.4 presents the logistic modeling on the prior-month of marijuana use. The most dominant predicting variables were marital status, educational level, and job mobility for both male and female employees. Job mobility turned out to be the most important work related variable to be positively significantly associated with current marijuana use (odd ratio= 1.06 for males and = 1.10 for females). For male employees, dim opportunity of promotion led to higher possibility of using marijuana. Also male employees who perceived that they were exposed to unhealthy conditions were more likely to use marijuana in the prior month than other male employees (odds ratio = 1.13, $p < 0.10$). Not all of the significant effects were in the direction as expected. For female employees, having higher level of self-esteem was associated with lower chances to be a current marijuana user, although the significance level was only marginal.

Table 5.3. Logistic Regression Modeling of Heavy Alcohol Use in the Prior 30 Days—Young Labor Force Participants (Age 23–31) in 1988

	Male				Female			
	Parameter Estimate	Wald Chi-Square	Standardized Estimate	Odds Ratio	Parameter Estimate	Wald Chi-Square	Standardized Estimate	Odds Ratio
Intercept	1.768***	11.29	.	.	1.452**	4.67	.	.
AGE	-0.0349*	3.48	-0.0439	0.97	-0.0646***	7.72	-0.080	0.94
BLACK	-0.486***	22.61	-0.107	0.62	-0.748***	27.12	-0.166	0.47
HISPANIC	-0.0260	0.02	-0.0029	0.97	-0.336	1.61	-0.037	0.72
MARRY88	-0.619***	56.80	-0.171	0.54	-0.879***	73.10	-0.242	0.42
HGC88	-0.079***	16.19	-0.105	0.92	-0.115***	18.25	-0.135	0.89
HGFATHER	0.034***	9.29	0.075	1.03	0.0324**	4.69	0.067	1.03
JOBEXYR	0.009	0.23	0.011	1.09	0.0476**	4.48	0.064	1.05
MANUAL	0.156	3.46	0.0004	1.01	0.158	1.91	0.038	1.17
JOBMOB88	-0.0026	0.078	-0.006	1.00	0.0371***	0.003	0.081	1.04
DISSATIS	0.0011	0.0003	0.0004	1.00	-0.0760	0.94	-0.030	0.93
JS88DANG	0.0643	2.04	0.0381	1.07	0.0447	0.44	0.021	1.05
JS88PAY	-0.0138	0.063	-0.006	0.99	-0.0375	0.33	-0.018	0.96
JS88PROM	0.045	0.95	0.0240	1.05	0.0514	0.94	0.029	1.05
JS88SECU	-0.018	0.12	-0.009	0.98	0.0169	0.071	0.008	1.01
JS88SURR	-0.0021	0.001	-0.0009	1.00	-0.0499	0.47	-0.021	0.95
JS88UNHE	-0.0017	0.001	-0.0009	1.00	-0.0288	0.19	-0.014	0.97
SE87	-0.0094	0.84	-0.0212	0.99	-0.0023	0.031	-0.005	1.00
Hosmer & Lemeshow Goodness-of-fit Statistic	4.576 with 8 df (p=0.802)				6.863 with 8 df (p=0.552)			
Adj. R ²	0.057				0.097			

Note: *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

While “flag” type of measures of drug use—ever used or not, is widely used in the various studies, we know little about how further detailed variances regarding the occasions of substance use are explained. In the following, I suggest that distribution assumptions other than normal

assumptions be used to capture the variabilities of employees' number of occasions of using alcohol or drugs in a certain period of time.

Table 5.4. Logistic Regression Modeling of Marijuana Use in the Prior 30 Days—Young Labor Force Participants (Age 23–31) in 1988

	Male				Female			
	Parameter Estimate	Wald Chi-Square	Standardized Estimate	Odds Ratio	Parameter Estimate	Wald Chi-Square	Standardized Estimate	Odds Ratio
Intercept	0.298	0.17	.	.	-0.245	0.056	.	.
AGE	-0.034	1.68	-0.043	0.97	-0.035	0.95	-0.044	0.97
BLACK	-0.236	2.54	-0.052	0.79	-0.271	1.621	0.060	0.76
HISPANIC	-0.036	0.018	-0.0041	0.97	-0.334	0.58	-0.036	0.72
MARRY88	-0.599***	25.69	-0.165	0.55	-0.660	17.03	-0.182	0.52
HGC88	-0.136***	23.39	-0.180	0.87	-0.102**	6.08	-0.118	0.90
HGFATHER	0.093***	30.96	0.206	1.10	0.0091	0.16	0.019	1.01
JOBEXYR	-0.017	0.41	-0.021	0.98	0.0034	0.009	0.0045	1.00
MANUAL	-0.0063	0.0027	-0.0017	0.99	-0.142	0.59	-0.034	0.87
JOBMOB88	0.061***	25.30	0.141	1.06	0.098***	31.72	0.211	1.10
DISSATIS	0.196*	4.56	0.076	1.22	0.0214	0.031	0.0085	1.02
JS88DANG	0.043	0.45	0.025	1.04	-0.0023	0.001	-0.0011	1.00
JS88PAY	-0.048	0.41	-0.021	0.95	-0.0615	0.38	-0.029	0.94
JS88PROM	-0.195***	9.66	-0.104	0.82	-0.0070	0.008	-0.0040	0.99
JS88SECU	-0.0525	0.58	-0.025	0.95	0.187*	3.57	0.092	1.21
JS88SURR	-0.074	0.95	-0.033	0.93	0.030	0.067	0.012	1.03
JS88UNHE	0.123*	3.54	0.067	1.13	-0.102	0.92	-0.050	0.90
SE87	-0.021	2.07	-0.047	0.98	-0.033*	2.86	-0.074	0.97
Hosmer & Lemeshow Goodness-of-fit Statistic	2.922 with 8 df (p = 0.939)				6.675 with 8 df (p = 0.572)			
Adj. R ²	0.097				0.071			

Note: *: p < 0.05; **: p < 0.01; ***: p < 0.001.

The Poisson regression modeling on employees' occasions of using marijuana/hashish in the prior 30 days is presented in Table 5.5a. With the respondents' age, race, education, marital status, and father's highest education being held constant, male workers who perceived lower chances to be promoted would be more likely to use marijuana or hashish in the prior month. The factor change in the expected count for a change of Δ in x_k equals

$$E(y|x, x_k + \Delta) / E(y|x, x_k) = \exp(\hat{\alpha}_k \Delta).$$

The parameter of JS88PROM can be interpreted as: For a one unit increase in the perception level of the opportunities of promotion, the expected count of the occasions to use marijuana/hashish decreases by a factor of .860 ($=\exp(-.151)$), holding all other variables constant. For female workers, the perception on the job promotion opportunity do not significantly influence their current marijuana/hashish behavior. However, women workers, having perceived higher level of job security would be positively associated with the tendency to be current marijuana/hashish users. Jobs with perceived dangerous characteristics had a positive effect on male workers' tendency to use marijuana and negative effect on women workers' tendency to use marijuana. Besides, those male workers who thought they were exposed to unhealthy working conditions were more likely than other male workers to use marijuana recently. With all the other variables being controlled, both male and female workers' self esteem were found to be negatively related to the employees' log odds of being the current marijuana users.

The Poisson regression result in Table 5.5a indicates that there was some unobserved heterogeneity—variance in the log of earnings that the covariates were unable to account for. A negative binomial model responds to this problem by adding a parameter to model

Table 5.5a. Poisson Regression Modeling of Occasions Using Marijuana/Hashish in the Prior 30 Days —Young Labor Force Participants (Ages 23–31) in 1988

	Male				Female			
	Parameter Estimate	Standard Error	Chi -Square	Pr > Chi.	Parameter Estimate	Standard Error	Chi - Square	Pr > Chi.
Intercept	-2.189***	0.371	34.80	0.0001	-3.026***	0.598	25.64	0.0001
AGE	0.0005	0.014	0.0016	0.968	-0.009	0.021	0.19	0.667
BLACK	-0.154**	0.075	4.14	0.042	-0.217*	0.126	2.98	0.085
HISPANIC	-0.295**	0.150	3.87	0.049	-0.808**	0.323	6.26	0.012
MARRY88	-0.402***	0.061	42.90	0.0001	-0.499***	0.093	28.72	0.0001
HGC88	-0.140***	0.014	99.17	0.0001	-0.137***	0.024	32.35	0.0001
HGFATHER	0.067***	0.008	62.54	0.0001	0.001	0.014	0.006	0.937
JOBEXYR	-0.045***	0.014	10.68	0.001	-0.002	0.020	0.01	0.921
MANUAL	-0.071	0.062	1.30	0.254	0.046	0.104	0.19	0.660
JOBMOB88	0.047***	0.006	65.43	0.0001	0.098***	0.009	118.44	0.0001
DISSATIS	0.127***	0.047	7.43	0.0064	-0.039	0.071	0.29	0.589
JS88DANG	0.068**	0.032	4.43	0.035	-0.141**	0.063	5.07	0.024
JS88PAY	0.004	0.038	0.012	0.9129	-0.091	0.058	2.53	0.112
JS88PROM	-0.151***	0.032	22.25	0.0001	0.040	0.047	0.74	0.389
JS88SECU	-0.045	0.035	1.69	0.193	0.185***	0.058	10.26	0.001
JS88SURR	-0.072*	0.038	3.59	0.058	0.151**	0.068	4.85	0.028
JS88UNHE	0.109***	0.033	11.04	0.0009	0.063	0.059	1.11	0.292
SE87	-0.025***	0.007	11.63	0.0006	-0.035***	0.011	9.43	0.002
Criteria for Assessing Goodness of Fit	Criterion	DF	Value	Value/DF	Criterion	DF	Value	Value/DF
	Deviance	2758	4723.32	1.713	Deviance	2335	2562.33	1.097
	Pearson Chi-square	2758	8798.12	3.190	Pearson Chi-square	2335	7533.54	3.226
Log Likelihood	-2050.37				-1200.18			

Note: *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

overdispersion. Even with the correct specification of the mean structure, estimates from the Poisson regression model with overdispersion are inefficient with standard errors that are biased downward (Cameron & Trivedi, 1986).

Table 5.5b presents the negative binomial regression coefficients with employees' occasions using marijuana/hashish in the prior 30 days as the response variable. The sociodemographic variables that showed significant effects were employees' marital status and education background which were negatively associated with the occasions of marijuana use. Fathers' educational level had the significant positive effect for male workers only. Looking at work and organizational variables, it was found that the number of years that the respondents had been employed had no significant effect on the number of occasions of current marijuana use. Even after taking overdispersion into account, job mobility remained as the dominant work related variable that had a significant positive effect on the number of occasions of current marijuana use for both male and female workers. Holding all other variables constant, when male workers changed jobs one more time than other male workers, the expected count of the occasions increases by a factor of 1.057 ($=\exp(.055)$); when female workers have changed jobs one time more than other female workers, the expected count of the occasions increases by a factor of 3.32 ($=\exp(.120)$). The hypothesis that employees who are more satisfied with their promotion opportunities were less likely to use drugs was supported for male workers. The numbers of the occasions of using marijuana by male workers are significantly sensitive to their perceived chances of being promoted. Changing male employees' perception of good promotion opportunities from "true" to "very "true" decreases the expected occasions of using marijuana in the prior month by a factor of .83 ($=\exp(-0.186)$), holding all other variables constant. (Or we can

Table 5.5b. Negative Binomial Regression Modeling of Occasions Using Marijuana/Hashish in the Prior 30 Days—Young Labor Force Participants (Ages 23–31) in 1988

	Male				Female			
	Parameter Estimate	Standard Error	Chi -Square	Pr > Chi.	Parameter Estimate	Standard Error	Chi- Square	Pr > Chi.
Intercept	-1.951**	0.803	5.90	0.02	-3.525***	1.243	8.04	0.005
AGE	0.006	0.027	0.05	0.82	-0.002	0.043	0.003	0.96
BLACK	-0.045	0.150	0.09	0.76	-0.234	0.258	0.82	0.37
HISPANIC	-0.381	0.292	1.71	0.19	-0.558	0.536	1.08	0.30
MARRY88	-0.451***	0.120	14.08	0.0002	-0.586***	0.189	9.68	0.002
HGC88	-0.169***	0.031	29.90	0.0001	-0.158***	0.049	10.42	0.001
HGFATHER	0.068***	0.017	16.10	0.0001	-0.001	0.029	0.002	0.97
JOBEXYR	-0.030	0.027	1.25	0.26	0.006	0.042	0.021	0.88
MANUAL	-0.049	0.122	0.16	0.69	-0.029	0.219	0.017	0.90
JOBMOB88	0.055***	0.014	15.55	0.0001	0.120***	0.026	22.03	0.0001
DISSATIS	0.168*	0.092	3.31	0.07	-0.042	0.142	0.09	0.77
JS88DANG	0.082	0.068	1.48	0.22	-0.110	0.136	0.65	0.42
JS88PAY	-0.030	0.078	0.14	0.71	-0.019	0.127	0.02	0.88
JS88PROM	-0.186***	0.064	8.37	0.004	0.011	0.100	0.01	0.91
JS88SECU	-0.048	0.077	0.39	0.53	0.130	0.126	1.07	0.30
JS88SURR	-0.052	0.081	0.41	0.52	0.203	0.138	2.15	0.14
JS88UNHE	0.100	0.069	2.09	0.15	0.065	0.128	0.25	0.61
SE87	-0.030*	0.015	3.90	0.05	-0.025	0.024	1.03	0.31
Criteria for Assessing Goodness of Fit	Criterion	DF	Value	Value/DF	Criterion	DF	Value	Value/DF
	Deviance		1369.12	0.496	Deviance		606.37	0.260
	Pearson Chi-square		2758.96	1.000	Pearson Chi-square		2335.54	1.000
Log Likelihood	-2029.25				-1027.29			

Note: *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

say, the expected occasions of using marijuana in the prior month would decrease by 17.3 percent ($=100[1 - \exp(-0.186)]$), holding all other variables constant. Considering the negative binomial regression parameters are very conservative estimates, this effect is in no sense trivial.

5.5 Discussion

It is interesting to note that drinking and drug use are directly predicted by a number of background and workplace-environment variables. Even though some organizational variables, such as the perceptions of surroundings at workplace, unhealthy work conditions, level of job pay show no significant influence on alcohol or drug use, other workplace related variables do even after the sociodemographic characteristics of the employees are controlled.

For instance, I find a persistent positive relationship between job mobility and drug use. This confirmed Kandel and Yamaguchi's (1987:874) finding that "drug users are individuals who would be likely to experience employment instability irrespective of their drug behavior."

In my literature review on drug use, I do not find any studies in which the relationship between job security and drug use or gender-moderated relationships were explicitly examined. Surprisingly, the logistic regression models in this study on prior-month of marijuana use, prior-year marijuana use, and lifetime cocaine use *all* indicate that for female workers, when the perceived job loss threat was low, the tendency to use drugs was high. In the literature beyond drug use, the unexpected direction of the job security effect was not nonexistent. In a study of a large Australian government organization, Neil and Snizek (1988) find a "surprising and interesting" result that perceived level of job security was not found to bear a negative relationship to employee job satisfaction across a number of datasets that they had. Neil and Snizek conjecture then that in organizations in which job security was virtually assured, employees may take such security for granted. The flexibility of companies to restructure can hurt people, but stability can hurt them even more in the long run by depressing economies (Kanter, 1993:324). The positive significant relationship between perceived job security and drug use is found to be associated with

female workers only, this may be attributed by different ways men and women consider family in their choice of work. Because of the persistent stereotype of father as provider, some men may feel that the cost of losing a job by engaging in drug use is too large while women may be less obligated to think so.

Differential associations between drug use and other variables by sex have rarely been found (e.g., Newcomb, Maddahian, & Bentler, 1986). My results indicate the contrary. While perceived opportunities of promotion were found to be a significant risk factor in drug use for male workers, perceived job security was a significant risk factor of drug use for women workers. The different influences associated with some of the workplace and organizational variables by gender generally support the earlier results of Kanter (1993), indicating that “gender difference in employee attitudes and behaviors are strongly influenced by gender differences in organizational power and promotion opportunity structure” (Neil & Snizek, 1988). As a consequence of women workers’ adaptation to a restrictive organizational power and opportunity structure, the perceived job promotion opportunities have less predicting power for female workers than for male workers. This gender differentiated pattern may also be attributed to different masculine and feminine styles of deviance. Sex roles might lead to different “style of pathology” (Horwitz & White 1987). Whereas feminine deviance is characterized by an internalization of distress, masculine deviance is more outwardly directed.

Table 5.6. A Summary of Hypotheses Testing Status and Highlights of Findings

Hypotheses Proposed in Chapter 2	Hypotheses Testing—Supported?	Highlights of Findings
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Manual Labor		<ul style="list-style-type: none"> Holding employees' age, race, marital status, education, and father's education constant, male employees working in manual labor occupations drink more frequently in the prior month than male workers in other occupations.
H5.1	Yes ^{1,2}	
Promotion		<ul style="list-style-type: none"> There is a significant negative relationship between workers' perceived promotion prospects and the workers' current marijuana use as well as the workers' occasions of using marijuana in the prior month. This relationship applies to male workers only and to marijuana use only.
H5.2	Yes ^{1,2}	
Job Dissatisfaction		<ul style="list-style-type: none"> The overall job dissatisfaction is not found to be significantly associated with either frequency of alcohol use or current heavy drinking in OLS and logistic regression models, after the sociodemographic characteristics and other perceived qualities of organizational characteristics are controlled. With regard to marijuana use, the results from Poisson and negative binomial models show that lower level of employees' job dissatisfaction is significantly associated with higher occasions of using marijuana in the prior month.
H5.3	Yes ^{1,2}	
Job security		<ul style="list-style-type: none"> For female workers only, higher level of the perceived job security is found to be associated significantly with the occasions of the prior month marijuana use, after other variables are controlled.
H5.4	No	
Working Conditions		<ul style="list-style-type: none"> While pleasant working environment appears to be associated negatively with male workers' occasions of using marijuana in the prior month, it appears to be associated positively with female workers' occasions of using marijuana in the prior month.
H5.5	Yes ^{1,2}	
Job Mobility		<ul style="list-style-type: none"> For female workers only, job mobility is positively related with the frequencies of using alcohol and the tendencies to drink heavily. For both male and female workers, job mobility is related positively and significantly to their prior month marijuana use For both male and female workers, job mobility is related positively and significantly to the occasions of using marijuana in the prior month.
H5.6	Yes	
Self-esteem		<ul style="list-style-type: none"> Self-esteem is not related to the frequencies of drinking or the tendency of heavy drinking for both male and female workers. For female workers only, self-esteem is negatively related to their tendencies of using marijuana in the prior month. For male workers only, self-esteem is negatively related to their occasions of using marijuana in the prior month.
H5.7	Mixed ^{1,2}	

Note: 1. The association is variant across gender;
2. The association is variant depending on the alcohol and drug use measurement.

Source: National Longitudinal Survey of Youth, 1979-1993

The number of years of employment is found to have a positive relationship with both the frequencies of alcohol use and current heavy alcohol use. This significant relationship held just for women workers with regard to alcohol use, it does not apply to male workers or marijuana use. One possible explanation is that women workers with more years of employment experience may have assumed the “non-traditional” role well and are more likely to consume alcohol more frequently and more heavily than other women who have less years of working experience. It is also possible that women may reduce their career development aspirations with the increase of their working years, however, their feelings of alienation are not reduced and as a result, they may use alcohol more often and more heavily at one time than other women workers.

The overall job dissatisfaction (DISSATIS) is not found to be significantly associated with either frequency of alcohol use or current heavy drinking in OLS and logistic regression models, after the sociodemographic characteristics and many perceived qualities of organizational facets were controlled. With regard to marijuana use, the results from Poisson and negative binomial models show that employees’ perception of the overall job quality¹⁵ is positively associated with the current marijuana use. This is consistent with the hypothesis that employees with low job satisfaction or high job stress are more frequently engage in withdrawal behaviors. This is the net effect after other variables including perceptions of the workplace are controlled. In a separate analysis, I also examined the correlations among these variables, especially between overall job satisfaction and the perceived opportunities for promotion and job security. The correlations found are all below 0.5, thus multicollinearity is not a problem. Job satisfaction and opportunities

¹⁵ Coding for this measure in this chapter was 1—like it very much, 2—like it somewhat, 3—dislike it somewhat, and 4—dislike it very much. Therefore, the higher the score on this measure, the more dissatisfied the respondents were with the job.

are closely related but they may mean different things. Having many opportunities may enhance job satisfaction, but a person can feel reasonably satisfied with the content of a job, but frustrated about future growth through it or movement between positions (Kanter, 1993:161). This may depress their aspirations and lead them to look to other realms, and to the extreme—drug use.

Addressing and investigating the relationship between job characteristics and substance use is important in identifying workplace policies and treatment programs which are needed to address social and health problems within the lives of individuals, and their work environment.

CHAPTER VI. OCCUPATION: WORK CULTURE AND TENSION REDUCTION

6.1 Introduction

The research reported in this Chapter is based on the working lives of people employed at various occupational levels in the United States. This chapter echoes the research questions and hypotheses raised in Chapter 2, investigates structural determinants of workers' substance use across occupations, and presents an analytic strategy to examine the potential occupational differences in employees' substance use. The study in this Chapter is an extension of the previous chapter, in the sense that it continues to investigate the characteristics of the workplace and their influence on the workers' alcohol and drug use. However, this Chapter differs from Chapter 5 in two major aspects: First, instead of studying the workplace characteristics perceived by the individual workers, I explicitly examine the potential effects of occupation on employees' alcohol and drug use behavior. If the previous Chapter focuses more on the interaction perspective, then the current Chapter takes a more structural and subcultural perspective. Second, instead of relying solely on the respondents' self reported attitudes and behaviors, I incorporate the "pseudo-objective" evaluation of the occupational characteristics. Strictly speaking, these measurements are still subjective, since the evaluations of the occupational information are still based on experts' human judgment. However, the measurements are relatively objective because the data are from a source external to the survey respondents, and scores have been proven to be valid and reliable.

In this Chapter I deal with a number of issues. After giving an overview of the sample, I undertake a preliminary analysis of a variety of alcohol and drug use measures across occupations.

I then examine the determinants of occupational characteristics in employees' alcohol and/or drug use. I take three steps to complete the analyses for the study in this chapter. First, I examine the occupationally differentiated alcohol and drug use behaviors of full-time workers; second, I examine the workplace characteristics that are particular to the specified occupations; and finally, I examine the multivariate relationships among occupational characteristics and workers' alcohol and drug use.

6.2 Variables

6.2.1 Data

As I described in Chapter 3, in this Chapter, I merge data from the 1997 National Household Survey on Drug Abuse and the 1998 Occupation Information Network data (O*NET 98).

I first listed the 383 Standard Occupational Classification codes that are found in the 1997 NHSDA, then matched them to the O*NET code based on the occupation category descriptions. Later, I verified this matching through the crosswalk tables that display various occupational classification systems and relate them to O*NET Occupational Codes and Titles¹⁶.

6.2.2 Dependent Variables

To assess workers' substance use and abuse, I use several alcohol and drug use measures. These include current alcohol use, current heavy alcohol use, current use of any illicit drug, prior-year use of marijuana, and prior-year use of cocaine. All these outcome variables are coded as dichotomous.

¹⁶ As a small number of the 383 SOC codes in the 1997 NHSDA have “many-to-many” relationship with the codes in the 1998 O*NET data, a direct query based on the crosswalk tables in the 1998 O*NET data is avoided.

6.2.3 Independent Variables

The independent variables include several dimensions of occupational worker characteristics.¹⁷ The first six independent variables concern working conditions. They are:

- Activity (W_BUSY): Workers are busy all the time;
- Independence (W_DOSELF): Workers do their work alone;
- Variety (W_VARIET): Workers have something different to do every day;
- Compensation (W_PAY): Workers are paid well in comparison with other workers;
- Security (W_SECURI): Workers have steady employment; and
- Working conditions (W_CONDIT): Workers have good working conditions.

The seventh variable is on-the-job autonomy (W_AUTONO). This variable is constructed as the mean of three separate items, namely, creativity, responsibility, and autonomy. This autonomy scale measures the extent to which employees work on their own and make decisions.

The eighth explanatory variable is on the ability-utilization extent of an occupation (W_UTILIZ). This variable is constructed from two items: ability utilization extent, which is the extent to which workers make use of their individual abilities, and achievement extent, which is the extent to which workers have a feeling of accomplishment. Occupations that have high ability-

¹⁷ The working conditions dimensions, the autonomy dimensions, and the achievement dimensions are extracted from the O*NET occupational values. The practice of using work values to describe occupations is based on the theory of work adjustment (TWA) developed during the Work Adjustment Project at the University of Minnesota under research Grants from the U. S. Department of Health, Education and Welfare (Dawis, England, and Lofquist, 1964; Dawis and Lofquist, 1984). This theory proposes that job satisfaction is directly related to the degree to which a person's values and corresponding needs are satisfied by his or her work environment. The TWA identifies six work values each with a corresponding set of needs. Three of them are included in the current analysis.

utilization values are results oriented and allow employees to use their strongest abilities, giving them a feeling of accomplishment.

All these occupational characteristics are coded on a scale of 1–5, with large numbers indicating higher values. I recoded these eight variables as dummy variables, with 0 indicating those occupations that have the corresponding characteristics values which are equal or less than the occupational means, and with 1 indicating those occupations that have the corresponding characteristics values which are larger than the occupational means. In the multivariate logistic regressions, occupations with value of 0 are treated as the reference categories.

6.2.4 Control Variables

It is conceivable that some occupations are unique, or that the pattern reflects some other dynamic. For instance, because heavy machine operators or field construction workers are predominantly male and administrative support personnel are predominantly female, the data may simply reflect gender differences. Another potential confounding effect comes from a situation that workers' income status is related to their occupational status, due to the fact that workers with various income levels are distributed unevenly across occupations. Moreover, as indicated in previous Chapters, young employees are also more likely to be concentrated in certain occupations. To adequately assess the phenomenon's scope, I include several control variables in the alternative models in the multivariate logistic regression analysis.

Since a job itself is assumed to be determined by various individual characteristics, five additional demographic variables are introduced as control variables. These variables include age (1 = age 18–25, 2 = age 26–34, and 3 = age 35–49), income (1 = <\$9,999, 2 = \$10,000–\$19,000, 3 = \$20,000–39,999, 4 = \$40,000–\$74,999, and 5 = \$75,000), education (1 = less than high

school, 2 = high school graduate, 3 = some college, and 4 = college graduate or higher), sex (1 = male and 2 = female), and race (1 = white, 2 = black, 3 = Hispanic, 4 = other). Those coded as “1” are treated as members in the reference group. Controls were selected on both theoretical grounds and empirical significance in the preliminary analysis.

6.3 Statistical Model

For estimation of proportions and for multivariate logistic regression analysis, I use SUDAAN (Shah et al., 1997), a software package and family of statistical procedures for analysis of data from complex sample surveys. SUDAAN provides estimates of population estimates and their standard errors, appropriate for a variety of sample designs, including the one used by NHSDA. The analyses are performed with weights reflecting the probability of each full-time worker’s being chosen in the sample.

6.4 Results

Table 6.1 presents descriptive statistics of self-reported alcohol and drug use across the 14 summarized occupational categories. Five occupational alcohol and drug use prevalence rates are estimated—two for alcohol use and three for illicit drug use (or three for current use and two for prior-year use).

As demonstrated in Figure 6.1, construction occupations (73.1 percent); sales occupations (69.2 percent); and executive, administrative, and managerial occupations (68.7 percent) have the highest percentage of full-time workers who are current drinkers. In terms of current heavy

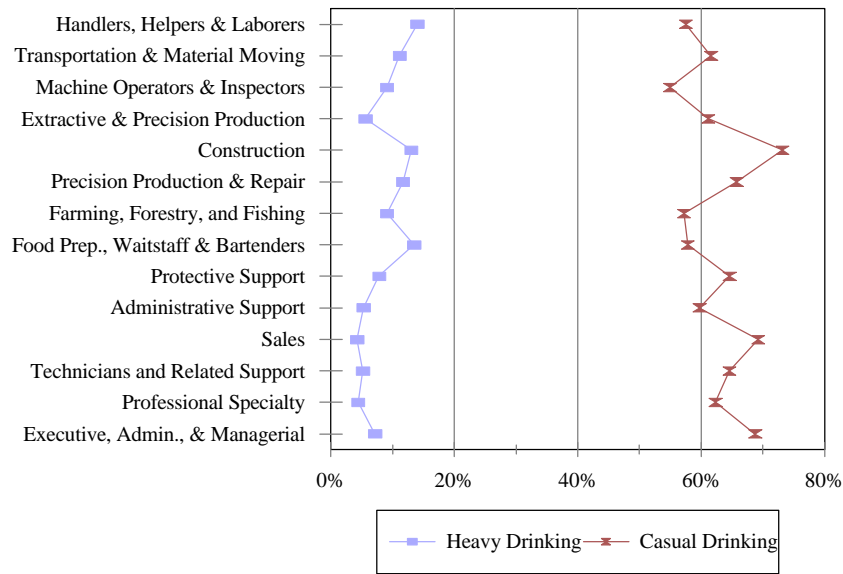


Figure 6.1. Alcohol User Profiles by Occupation

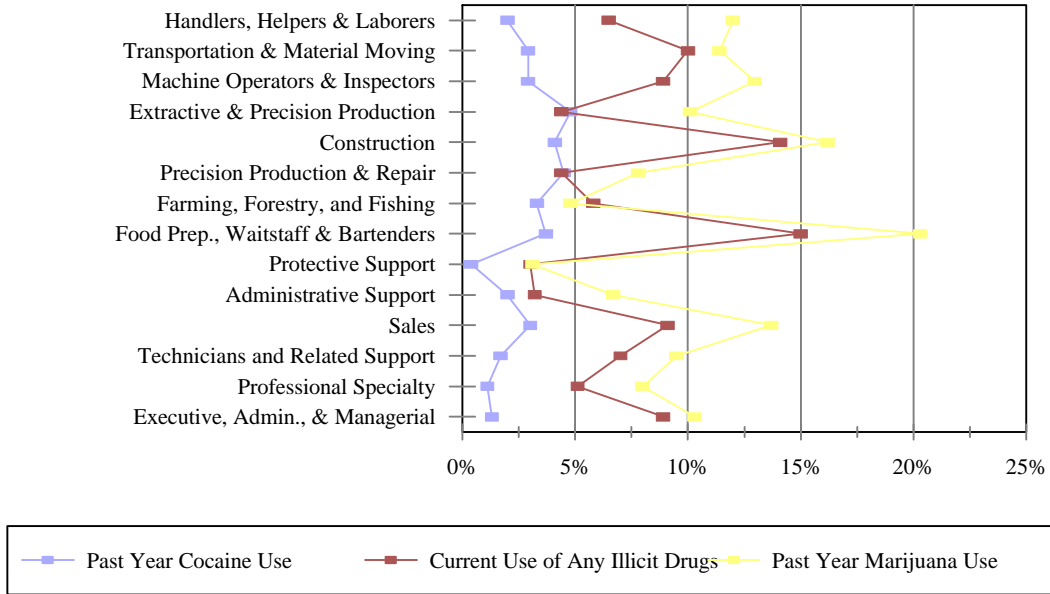


Figure 6.2. Drug User Profiles by Occupation

Table 6.1. Percentage of Full-Time Workers, Ages 18–49, Reporting Alcohol and Drug Use, by Occupation Category, 1997

	Current Alcohol and Drug Use			Prior-year Drug Use	
	ALCMON	HVYDRK2	SUMMON	MRJYR	COCYR
Total (N=7892)	63.2 (1.4)	7.8 (0.6)	7.7 (0.5)	10.9 (0.7)	2.4 (0.3)
Executive, Admin., & Managerial (N = 913)	68.7 (3.2)	7.2 (1.5)	8.9 (2.1)	10.3 (1.9)	1.3 (0.5)
Professional Specialty (N=913)	62.3 (2.7)	4.4 (1.4)	5.1 (1.0)	8.0 (1.6)	1.1 (0.5)
Technicians and Related Support (N=340)	64.5 (4.4)	5.2 (1.6)	7.0 (3.1)	9.5 (3.2)	1.7 (1.0)
Sales (N=833)	69.2 (3.1)	4.3 (0.9)	9.1 (2.3)	13.7 (2.5)	3.0 (1.0)
Administrative Support (N=1254)	59.7 (2.7)	5.3 (1.3)	3.2 (0.6)	6.7 (1.0)	2.0 (0.6)
Protective Service (N=165)	64.6 (5.4)	7.8 (2.3)	3.0 (1.6)	3.1 (1.5)	0.4 (0.3)
Food Prep., Waitstaff & Bartenders (N=1021)	57.8 (2.9)	13.5 (2.9)	15.0 (2.6)	20.3 (2.8)	3.7 (1.3)
Farming, Forestry, and Fishing (N=196)	57.2 (7.6)	9.1 (2.6)	5.8 (3.1)	4.8 (2.2)	3.3 (1.9)
Precision Production & Repair (N=277)	65.7 (6.1)	11.7 (2.5)	4.4 (1.6)	7.8 (2.3)	4.5 (1.6)
Construction (N=409)	73.1 (4.0)	13.0 (3.6)	14.1 (2.8)	16.2 (3.0)	4.1 (1.3)
Extractive & Precision Production (N=219)	61.1 (5.6)	5.6 (2.0)	4.4 (1.6)	10.1 (3.0)	4.8 (2.3)
Machine Operators & Inspectors (N=643)	54.9 (3.4)	9.1 (1.8)	8.9 (1.8)	12.9 (1.9)	2.9 (0.9)
Transportation & Material Moving (N=336)	61.6 (5.0)	11.1 (2.8)	10.0 (3.1)	11.4 (3.1)	2.9 (1.4)
Handlers, Helpers & Laborers (N=382)	57.5 (6.2)	14.0 (3.7)	6.5 (1.5)	12.0 (2.3)	2.0 (0.8)

Note: 1. This analysis was conducted using SUDAAN 7.5; 2. Standard errors in parentheses.

Source: SAMHSA, NHSDA 1997

Table 6.2. Descriptive Statistics for Work Conditions, by Occupation Category, 1997

	Working Conditions					
	Activity (1-5)	Independence (1-5)	Variety (1-5)	Compensation (1-5)	Security (1-5)	Working condition
Total (N=7477)	3.48 (.01)	3.03 (.01)	2.93 (.01)	3.09 (.01)	3.35 (.01)	3.21 (.01)
Executive, Admin., & Managerial (N = 864)	3.57 (.02)	2.76 (.02)	3.23 (.02)	3.19 (.04)	3.28 (.03)	3.72 (.03)
Professional Specialty (N=846)	3.81 (.02)	2.73 (.05)	3.46 (.01)	3.38 (.05)	3.92 (.02)	3.58 (.04)
Technicians and Related Support (N=304)	3.42 (.04)	3.06 (.06)	3.01 (.02)	3.43 (.03)	3.69 (.03)	3.68 (.05)
Sales (N=833)	3.42 (.03)	2.91 (.02)	3.24 (.03)	3.21 (.03)	3.20 (.02)	3.75 (.02)
Administrative Support (N=1170)	3.57 (.01)	3.22 (.04)	2.61 (.03)	2.94 (.02)	3.44 (.02)	3.57 (.03)
Protective Service (N=165)	3.06 (.11)	2.55 (.09)	3.04 (.07)	2.54 (.08)	3.90 (.04)	2.48 (.07)
Food Prep., Waitstaff & Bartenders (N=1021)	3.27 (.01)	2.89 (.03)	2.52 (.03)	2.59 (.03)	3.21 (.03)	2.65 (.02)
Farming, Forestry, and Fishing (N=196)	3.16 (.04)	3.33 (.04)	2.73 (.06)	2.17 (.06)	2.44 (.05)	2.13 (.04)
Precision Production & Repair (N=274)	3.43 (.02)	3.61 (.05)	3.02 (.02)	3.26 (.03)	3.50 (.02)	2.80 (.03)
Construction (N=359)	3.26 (.02)	3.11 (.03)	2.90 (.04)	3.26 (.02)	2.95 (.03)	2.34 (.03)
Extractive & Precision Production (N=212)	3.46 (.04)	2.92 (.08)	3.09 (.08)	3.25 (.03)	3.37 (.03)	3.00 (.07)
Machine Operators & Inspectors (N=480)	3.69 (.02)	3.60 (.02)	2.04 (.02)	2.70 (.02)	3.09 (.01)	2.65 (.04)
Transportation & Material Moving (N=336)	3.17 (.03)	3.93 (.05)	2.34 (.02)	3.67 (.07)	3.13 (.03)	2.36 (.03)
Handlers, Helpers & Laborers (N=377)	3.27 (.02)	2.73 (.02)	2.56 (.04)	2.61 (.04)	2.69 (.02)	2.62 (.04)

Note: 1. This analysis was conducted using SUDAAN 7.5; 2. Standard errors in parentheses were calculated based on average scores of the related occupational attributes for individuals in NHSDA. Due to the commonality within occupations and small size of the number of occupation titles, the actual standard errors should be larger than those indicated in the table.

Source: 1. The raw occupational characteristics data were obtained from the National O*NET Consortium at <http://www.onetcenter.org>. The O*Net occupation codes were converted by this author to the 1990 Standard Occupation Classification codes and then merged by this author to the 1997 National Household Survey on Drug Abuse.

Table 6.3. Descriptive Statistics of Autonomy and Achievement Scales, by Occupational Categories, 1997

	Autonomy	Achievement
Total (N = 7477)	3.00 (0.02)	3.19 (0.02)
Executive, Admin., and Management (N = 864)	3.63 (0.01)	3.53 (0.02)
Professional Specialty (N = 846)	3.98 (0.03)	4.27 (0.01)
Technicians and Related Support (N = 304)	3.01 (0.05)	3.95 (0.02)
Sales (N = 833)	3.34 (0.05)	3.27 (0.03)
Administrative Support (N = 1170)	2.41 (0.03)	2.70 (0.03)
Protective Service (N = 165)	2.88 (0.08)	2.83 (0.01)
Food Prep., Waitstaff & Bartenders (N = 1021)	2.27 (0.06)	3.55 (0.06)
Farming, Forestry, and Fishing (N = 196)	2.11 (0.08)	2.41 (0.05)
Precision Production & Repair (N = 274)	2.97 (0.02)	2.20 (0.06)
Construction (N = 359)	2.82 (0.04)	3.13 (0.03)
Extractive & Precision Production (N = 212)	3.19 (0.07)	3.17 (0.03)
Machine Operators & Inspectors (480)	2.19 (0.03)	3.26 (0.07)
Transportation & Material Moving (N = 336)	2.51 (0.02)	2.61 (0.02)
Handlers, Helpers & laborers (N = 377)	1.95 (0.06)	2.62 (0.01)

Note: The Achievement scale is based on two items: 1. Making use of individual abilities; 2. Getting a feeling of accomplishment. The autonomy scale is based on three items: 1. Creativity; 2. Responsibility; and 3. Autonomy.

drinking, the handler, helper, and laborer occupations (14.0 percent) and the food preparation, wait staff, and bartender occupations (13.5 percent) have the highest rates, followed by construction, which again has an unusually high rate, at 13.0 percent. The heavy-drinking profile curve further reveals that actually almost all the blue-collar type of occupations, except the extractive and precision production occupations, have proportionately more full-time workers who are current heavy drinkers than the white-collar type of occupations.

The occupations with the largest proportion of current users of any illicit drug are food preparation, wait staff and bartenders (15.0 percent); construction (14.1 percent); transportation and material moving (10.0 percent); sales (9.1 percent); machine operators and inspectors (8.9 percent); and executives, administrators, and managers (8.9 percent). The current use of any illicit drugs and the prior-year use of marijuana show a similar pattern, reflecting the fact that marijuana use constitutes the largest proportion of any illicit drug use.

Logistic regression equations were then estimated to predict current alcohol use, current heavy drinking, current use of any illicit drug, prior-year marijuana use, and prior-year cocaine use; these variables were examined as a function of occupational characteristics and individual attributes. All eight occupational characteristics variables were recoded into dichotomous variables, with those values higher than the occupational mean coded as “1,” and those values equal or lower than the occupational mean coded as “0.” In the logistic regression analysis, occupations that are coded as 0 for a certain occupational feature are used as the reference category. Tables 6.4 and 6.5 present the statistically significant logistic regression results for a variety of alcohol and drug use measures, both with and without controlling for demographic variables. Among the characteristics of the eight occupational dimensions included in the

Table 6.4. Significant Odds Ratios with Sociodemographic Characteristics NOT Controlled

	Current Use			Prior-year Use	
	Alcohol (ALCMON)	Heavy Drinking (HVYDRK2)	Any Illicit Drug Use (SUMMON)	Marijuana (MRJYR)	Cocaine (COCYR)
Workload	– ¹	–	–	–	–
Job Independence	–	–	–	–	–
Job Variety	–	–	–	–	0.42 [0.18, 1.01] ²
Job Compensation	1.26 [1.03, 1.55]	–	–	–	–
Job Security	0.77 [0.61, 0.98]	–	0.52 [0.34, 0.82]	0.64 [0.46, 0.89]	–
Working Condition	–	0.46 [0.29, 0.71]	–	–	–
Job Autonomy	–	–	–	–	4.08 [1.27, 13.11]
Skill Utilization	–	–	–	–	0.24 [0.09, 0.67]
-2 Log Likelihood ³	111.54	92.58	67.18	46.22	53.17

Notes: 1. –: Estimates are suppressed because the p-value of the Wald F statistics for the logistic regression parameters are greater than .05.

2. Lower 95% limit and upper 95% limit of the associated odds ratios are in the brackets.

3. The degrees of freedom: 8

Table 6.5. Significant Odds Ratios with Sociodemographic Characteristics¹ Controlled

	Current Use			Prior-year Use	
	Alcohol (ALCMON)	Heavy Drinking (HUYDRK2)	Any Illicit Drug Use (SUMMON)	Marijuana (MRJYR)	Cocaine (COCYR)
Workload	– ²	–	–	–	–
Job Independence	–	–	–	–	–
Job Variety	–	–	–	–	0.36 [0.15, 0.88] ^{3,4}
Job Compensation	–	–	–	–	–
Job Security	0.77 [0.59, 1.00]		0.59 [0.36, 0.96]	0.68 [0.48, 0.97]	–
Working Condition	–	–	–	–	2.67 [1.26, 5.66]
Autonomy	–	–	–	–	–
Skill Utilization	–	–	–	–	–
-2 Log Likelihood ⁵	412.47	411.26	259.39	341.35	163.80

- Notes: 1. Controlled variables include employees' age, gender, race, income, and education.
2. –: Estimates are suppressed because the p-value of the Wald F statistics for the logistic regression parameters are greater than .05.
3. Lower 95% limit and upper 95% limit of the associated odds ratios are in the brackets.
4. The reference groups are those occupations having lower level of scores.
5. The degrees of freedom: 21

specified model, “level of steady employment” has the most important impact on current alcohol use, current use of any illicit drug, and prior-year use of marijuana; odds ratios are 0.77, 0.52, and 0.64, respectively. In other words, full-time employees in occupations with higher-than-average employment security are 0.77, 0.52, and 0.64 times as likely to be current drinkers, current users of any illicit drug, and prior-year marijuana users, respectively, than to have abstained from substance use. The impact of employment stability remains significant statistically and empirically, regardless of the workers’ race, age, gender, income, and education, such that after controlling for these demographic characteristics, the odds ratios are 0.77, 0.59, and 0.68, respectively. Therefore, regardless of personal background, workers who enjoy steady employment are much less likely to drink alcohol or use any illicit drug, including marijuana alone, than other workers.

6.5 Discussion

Causal drinking has positive functions for the work of executives, administrators, and managers, which may explain why they are more likely than others to be current drinkers. Meanwhile, the same executive and managerial occupations, together with other professional and semi-professional types of occupations,¹⁸ maintain lower proportions of workers who are current heavy drinkers. A probable explanation is that because professionals and semi-professionals are trained to handle any situation, their occupational cultures view heavy drinking as a loss of control, and engaging in this behavior could jeopardize their judgment at crucial times.

¹⁸ These include the professional specialty, technical and related support, sales, and extractive and precision production occupations.

The descriptive results based on the data presented generally confirm the proposition in social deviance literature that those drugs which are considered the most deviant are likely to be the most used among less politically and socially powerful groups, including working-class individuals and those in socially marginal occupations (Clinard & Meier, 1995). Overall, managers, white-collar workers, and skilled blue-collar workers have lower prevalence rates of both drug use and heavy alcohol use. One possible explanation is that stress and substance use go hand in hand, with drugs and alcohol being used as an outlet for persons who hold relatively low occupational positions.

In a recent study on the effects of alienating work on occupational stress, Peterson (1999) finds that managers, white-collar workers, and skilled blue-collar workers report the least stress on average, which is consistent with managers' and white-collar workers' low scores for alienating work. My findings here indicate that blue-collar factory (unskilled) workers have the highest average stress scores, which corresponds with their high scores for having an alienating working experience. It appears that as occupational status decreases, heavy alcohol use and controlled drug use increase. Another possible explanation for this is that an interaction effect exists for employment security and substance use. This potential interaction effect needs attention, especially into the 20th century, as management in contracting economies may seek to increase productivity by modifying work structures, which would increase employees' concerns regarding job security. Job security by occupation is investigated explicitly in the multivariate logistic regression models in this chapter.

The multivariate logistic regression results estimated by SUDAAN reveal that employees in well-paid occupations are more likely to have used alcohol in the prior month than employees

in lower paying occupations (see Table 6.4). Employees' financial well-being, however, has no effect on their heavy drinking behavior. Instead, the working conditions of an occupation have a significant negative effect on workers' heavy alcohol use. However, after demographic characteristics are controlled, the significant effects of wage/salary level and working conditions on casual drinking and heavy drinking disappear. Clearly, the population of workers is not evenly distributed across occupations, and some workers with certain demographic characteristics are more likely to concentrate on certain occupations. Those occupations that pay well may, very naturally, have more employees who earn higher incomes. The full effect of the occupational working conditions on employees' heavy drinking behavior, before other variables are controlled, supports the hypothesis of the association between negative work conditions and heavy drinking. Workers may drink heavily to cope with harsh working conditions and relax from fatigue. The disappearance of the significance of this effect, after other variables are controlled, suggests that occupational working conditions alone may not be enough to explain why some employees are current heavy drinkers while others are not, although heavy drinking is disproportionately associated with some occupations.

While alienating work may arise from a position in which one has limited control and influence over the labor process (Schwalbe & Staples, 1986), the multivariate logistical regressions do not reveal significant effects from occupational autonomy or job independence. Instead, steady employment appears to exert the most significant negative effect on employees' alcohol and drug use.

Among the three drug-related variables included in the analysis, both current illicit drug use and prior-year marijuana use were influenced by occupational employment steadiness. This

commonality is not surprising, since a large proportion of people who have used any illicit drug have used marijuana.¹⁹

Of all the alcohol and drug use variables, no significant differences are detected that might be attributable to work activities, degree of independence on the job, or feelings of accomplishment.

It appears that the etiology of cocaine use is different from alcohol and other types of drug use; no evidence is found to support Newcomb and Bentler's (1990) statement that the antecedents to cocaine use are general, rather than specific, rather, the results suggest that cocaine use needs separate attention. One of this study's most important findings regarding cocaine use is that the levels of job variety and job autonomy play a significant role in workers' cocaine use. Consistent to my hypothesis, job variety is negatively related to employees' cocaine use. The impact of job variety upon workers' cocaine use is found to be immutable, even after workers' gender, race, age, income, and education are controlled (the odds ratio is 0.42 before the sociodemographic variables are controlled, and 0.36 after these variables are controlled). It appears obvious that a significant occupational cluster effect exists; all else being equal, employees' odds of using cocaine, when working in an occupation with greater job variety, decrease 64 percent.

Inconsistent with my hypothesis that job autonomy is negatively related to drug use, the data show that employees in occupations with greater job autonomy are actually 4.08 times more likely to use cocaine than employees with less autonomy (95 percent confidence interval of [1.27,

¹⁹ According to a separate analysis based on the 1997 NHSDA, 81.1 percent of any illicit drug users are marijuana users, and 62.3 percent of any illicit drug users use marijuana only.

13.11]). One interpretation is that employees with jobs that require high levels of autonomy, creativity, and responsibility tend to use cocaine to enhance their feelings of power and be more creative. Another possible explanation may stem from the fact that persons whose jobs have a lot of autonomy are also being paid a lot and hence persons in these jobs can afford to buy the drugs. As the occupational compensation level is also introduced as a covariate variable in the model, the net effect from the occupational autonomy demonstrates its importance by itself. Furthermore, cocaine users may be more likely to choose occupations that grant them greater autonomy. Further research may consider to determine whether this “selection” effect exists. One provocative piece of evidence comes from observations that many drug-related deaths, as well as arrests for drug possession, come from within the music and film industry (McFarland, 1997).

The above results have several ramifications. First, among occupational characteristics, steady employment has the most pronounced effect on alcohol and drug use, while characteristics such as the pace of activity, job independence, and feelings of accomplishment have no effect on employees’ alcohol and drug use.

Second, the significant effects of occupational characteristics on employees’ alcohol and controlled drug use found here also provide rooms and insights for managers and organizational controllers to respond to the contingencies. As Wokutch (1990:2) points out in a cross-national study on occupational safety and health performance, considerable variance among industries, firms, and plants may indicate that “organizational efforts to address these issues can make a difference.” It is also recognized that managers’ response to the contingency may be made according to their perceptions, their implicit theories, preferences, values, interests and power

Table 6.6. A Summary of Hypotheses Testing Status and Highlights of Findings

Hypotheses Proposed in Chapter 2	Hypotheses Testing—Supported?	Highlights of Findings
Job Autonomy		<ul style="list-style-type: none"> Holding employees’ age, gender, race, income, and education constant, job autonomy at the occupational level is not significantly related to employees’ casual or heavy drinking behavior. Employees in occupations with higher job autonomy are significantly four times more likely to use cocaine in the prior year than employees in other occupations. This effect fades away when employees’ age, gender, race, income, and education are controlled.
H6.1a	No	
H6.1b	Positive Full Effect ¹	
Workload		<ul style="list-style-type: none"> Holding employees’ age, gender, race, income, and education constant, employees in occupations associated with heavier workloads do not differ significantly from other employees in both their alcohol and controlled drug use behavior.
H6.2a	Yes	
H6.2b	Yes	
Job Variety		<ul style="list-style-type: none"> Job variety is not found to be associated with employees’ casual or heavy drinking behavior. Higher job variety of an occupation is significantly associated with employees’ lower tendency to use cocaine, regardless of employees’ age, gender, race, income, and education.
H6.3a	No	
H6.3b	Yes	
Skill Utilization		<ul style="list-style-type: none"> Employees’ alcohol use behavior is not associated with the average occupational skill utilization level. Occupational skill utilization level is negatively associated with employees’ prior-year cocaine use; this significant association disappears when individual characteristics are controlled.
H6.4a	No	
H6.4b	Full effect	
Job Independence		<ul style="list-style-type: none"> Employees who usually work on their own are not different in their alcohol use behavior. Employees who usually work on their own are not different in their controlled drug use behavior.
H6.5a	Yes	
H6.5b	Yes	
Job Security		<ul style="list-style-type: none"> Occupational job security level is found to be negatively associated with the employees’ tendency to use alcohol or any illicit drugs, regardless of employees’ age, gender, race, income, and education.
H6.6a	Yes	
H6.6b	Yes	
Job Compensation		<ul style="list-style-type: none"> Employees in occupations that provide higher compensations are more likely to drink casually; when the background characteristics are controlled, no association has been found with employees’ casual or heavy drinking behavior as well as their drug use behavior.
H6.7a	Full effect	
H6.7b	No	
Working Conditions		<ul style="list-style-type: none"> Employees who work under better working conditions are less likely to be heavy drinkers than employees who work under less desirable working conditions. No significant association is found after the individual characteristics variables are controlled. Regardless employees’ age, gender, race, income, and education, better working conditions are associated significantly with employees’ cocaine use in the prior year.
H6.8a	Full effect	
H6.8b	Positive Effect ¹	

Note: 1. The positive effect is significant, but not in the hypothesized direction.

Source: National Household Survey on Drug Abuse, 1997; National Occupation Information Network Database, 1998

(Child, 1972). How managers execute their “strategic choice” (Child, 1972) and how it is related to the workplace drug control policies is worthwhile to be studied in future research.

6.6 Conclusion

In this Chapter, I have attempted both to clarify the relationship between macro-occupational characteristics and individual workers’ alcohol and drug use, as well as to illustrate one way in which the sociological study of substance use and abuse can be usefully developed.

In sum, occupational conditions influence alcohol and drug use among employees, albeit in more complex ways than suggested by much of the organizational stress occupational subculture literature. Regardless of employees’ age, race, gender, education level, and income level, employment security maintains a significant effect on alcohol and illicit drug use, with the exception of heavy drinking and cocaine use.

CHAPTER VII. DOES DRUG USE INFLUENCE EMPLOYEES' WAGE GROWTH TRAJECTORIES? A GROWTH-CURVE MODELING APPROACH

7.1 Introduction

Some researchers have speculated that a potential negative impact of drug use on earnings may be lagged, not manifesting itself until later in a drug user's work career (Kandel, Modssel, & Kaestner 1987; Kandel, Chen, & Gill, 1995). Based on this hypothesis, I conducted multilevel modeling analyses (Bryk & Raudenbush, 1992; Bryk, Raudenbush, & Congdon, 1996) to investigate not only the factors that influence that mean level of earnings, but also factors that may influence earnings growth. The following equation illustrates the basic idea behind this growth-curve model:

$$Y = \delta + \delta * \text{TIME} + e$$
$$\delta = \hat{\alpha}_0 + \hat{\alpha}_1 \text{ DEM} + \hat{\alpha}_2 \text{ ALC} + r \quad [7.1]$$

where y is the log of wages, DEM is a vector containing demographic variables, ALC is a vector of alcohol use variables, and e is an error term.

7.2 Objective of the Study

By utilizing multi-level models on the wage growth curve, I conduct my analyses in three major parts: (1) I estimate the mean growth curve and the extent of individual variations around it; (2) I assess the reliability of measures for both status and change; and (3) I model the relationships between person-level predictors and both status and change.

7.3 Repeated-Observations Model (Level 1)

I assume that Y_{it} , the observed status at time t for individual i , is a function of a systematic growth trajectory or growth curve plus random error. The generic Level 1 model is thus:

$$Y_{it} = \delta_{0i} + \delta_{1i}a_{it} + \delta_{2i}a_{it}^2 + \dots + \delta_{pi}a_{it}^p + e_{it} \quad [7.2]$$

for $i = 1, \dots, n$ subjects, where a_{it} is the age at time t for person i , and δ_{pi} is the growth trajectory parameter p for subject i associated with the polynomial of degree P (i.e., $p=0, \dots, P$). Each person is observed on T_i occasions. Missing time points for some observations are allowed in HLM estimations.

As a first step in the growth-modeling approach, a suitable wage model should be chosen to represent individual change over time. These Level 1 models represent the outcomes of interest—employees' wages, as a function of time and individual specific "growth parameters." It is important to note that changes in wages across several time points can take either linear or nonlinear forms. In this study, I consider the panel data starting from year 1988 up to 1993 in the growth-curve model. Across these 6 time points, respondents were maturing from their mid-20s to mid-30s. It is reasonable to assume that the changes occurring in this period would be linear. An "eyeball" examination of the descriptive statistics (see Tables 7.1 to 7.7) confirmed this conjecture. Preliminary analysis assuming a curvilinear relationship within this timeframe indicated that parameters for the quadratic term was not significant. Although changes in wage can be nonlinear over a long period, the linear change model should provide a good approximation for the growth-curve analysis over a 6-year period. Therefore, in the following

Table 7.1. Descriptive Statistics for the Log of Earnings of Labor Force Participants by Age, Cohort, and Sex

	23-25 years	24-26 years	25-27 years	26-28 years	27-29 years	28-30 years	29-31 years	30-32 years	31-33 years	32-34 years	33-35 years	34-36 years
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Cohort 1												
Male (n = 860)	9.49*** (0.75)	9.70*** (0.66)	9.82*** (0.61)	9.88*** (0.63)	9.91*** (0.73)	9.97*** (0.72)	–	–	–	–	–	–
Female (n= 632)	9.24*** (0.90)	9.47*** (0.77)	9.64*** (0.63)	9.68*** (0.73)	9.74*** (0.69)	9.78*** (0.71)	–	–	–	–	–	–
Cohort 2												
Male (n = 859)	–	–	–	9.76*** (0.64)	9.86*** (0.65)	9.96*** (0.60)	10.00 (0.65)	10.03*** (0.70)	10.07*** (0.70)	–	–	–
Female (n= 764)	–	–	–	9.42*** (0.74)	9.53*** (0.77)	9.63*** (0.67)	9.71*** (0.67)	9.75*** (0.67)	9.76*** (0.77)	–	–	–
Cohort 3												
Male (n = 541)	–	–	–	–	–	–	9.87*** (0.68)	9.98*** (0.60)	10.07*** (0.55)	10.10*** (0.63)	10.14*** (0.66)	10.19*** (0.69)
Female (n = 427)	–	–	–	–	–	–	9.45*** (0.84)	9.59*** (0.76)	9.64*** (0.78)	9.74* (0.72)	9.78*** (0.77)	9.81*** (0.91)

Note: Dashes indicate not applicable.

Table 7.2. Descriptive Statistics for the Log of Earnings by Age, Cohort, and Current Alcohol Use—MALES ONLY

	23-25 years	24-26 years	25-27 years	26-28 years	27-29 years	28-30 years	29-31 years	30-32 years	31-33 years	32-34 years	33-35 years	34-36 years
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Cohort 1												
User (n= 712)	9.51* (0.74)	9.71* (0.66)	9.83 (0.62)	9.89 (0.65)	9.93* (0.73)	9.99* (0.72)	–	–	–	–	–	–
Non-user (n= 148)	9.39* (0.79)	9.61* (0.67)	9.77 (0.60)	9.84 (0.53)	9.82* (0.74)	9.87* (0.72)	–	–	–	–	–	–
Cohort 2												
User (n = 703)	–	–	–	9.77 (0.64)	9.87 (0.66)	9.98** (0.59)	10.02** (0.64)	10.04 (0.70)	10.09** (0.69)	–	–	–
Non-user (n= 156)	–	–	–	9.70 (0.65)	9.80 (0.61)	9.84** (0.64)	9.89** (0.69)	9.95 (0.67)	9.97** (0.71)	–	–	–
Cohort 3												
User (n = 438)	–	–	–	–	–	–	9.90** (0.67)	10.02*** (0.58)	10.10** (0.56)	10.14*** (0.63)	10.17*** (0.67)	10.22** (0.69)
Non-user (n = 103)	–	–	–	–	–	–	9.75** (0.72)	9.83*** (0.66)	9.96** (0.53)	9.95*** (0.61)	9.98*** (0.59)	10.05** (0.66)

Note: Dashes indicate not applicable.

Table 7.3. Descriptive Statistics for the Log of Earnings by Age, Cohort, and Current Alcohol Use—FEMALES ONLY

	23-25 years	24-26 years	25-27 years	26-28 years	27-29 years	28-30 years	29-31 years	30-32 years	31-33 years	32-34 years	33-35 years	34-36 years
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Cohort 1												
User (n= 434)	9.29* (0.89)	9.56*** (0.66)	9.70*** (0.60)	9.76*** (0.68)	9.83*** (0.64)	9.86*** (0.66)	–	–	–	–	–	–
Non-user (n= 198)	9.14* (0.92)	9.28*** (0.94)	9.49*** (0.67)	9.50*** (0.79)	9.57*** (0.75)	9.61*** (0.78)	–	–	–	–	–	–
Cohort 2												
User (n = 500)	–	–	–	9.47*** (0.72)	9.59*** (0.81)	9.70*** (0.65)	9.78*** (0.62)	9.80*** (0.63)	9.81** (0.72)	–	–	–
Non-user (n= 264)	–	–	–	9.32*** (0.78)	9.42*** (0.70)	9.50*** (0.71)	9.57*** (0.72)	9.65*** (0.72)	9.68** (0.84)	–	–	–
Cohort 3												
User (n = 290)	–	–	–	–	–	–	9.49 (0.83)	9.62 (0.78)	9.70** (0.77)	9.78* (0.73)	9.81 (0.77)	9.84 (0.95)
Non-user (n = 137)	–	–	–	–	–	–	9.36 (0.85)	9.54 (0.71)	9.51** (0.80)	9.65* (0.69)	9.70 (0.79)	9.74 (0.81)

Note: Dashes indicate not applicable.

Table 7.4. Descriptive Statistics for the Log of Earnings of Labor Force Participants by Age, Cohort, and Prior-Year Marijuana Use—MALES ONLY

	23-25 years	24-26 years	25-27 years	26-28 years	27-29 years	28-30 years	29-31 years	30-32 years	31-33 years	32-34 years	33-35 years	34-36 years
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Cohort 1												
User (n= 270)	9.38*** (0.84)	9.58*** (0.72)	9.73*** (0.64)	9.81** (0.65)	9.80*** (0.74)	9.88** (0.71)	–	–	–	–	–	–
Nonuser (n= 590)	9.55*** (0.70)	9.75*** (0.63)	9.86*** (0.60)	9.92** (0.62)	9.96*** (0.72)	10.01** (0.72)	–	–	–	–	–	–
Cohort 2												
User (n = 219)	–	–	–	9.65*** (0.70)	9.77** (0.62)	9.86*** (0.56)	9.91** (0.62)	9.92** (0.65)	9.94*** (0.76)	–	–	–
Nonuser (n= 640)	–	–	–	9.80*** (0.62)	9.89** (0.66)	9.99*** (0.61)	10.03** (0.66)	10.06** (0.70)	10.11*** (0.67)	–	–	–
Cohort 3												
User (n = 126)	–	–	–	–	–	–	9.86 (0.60)	9.93 (0.58)	10.00* (0.58)	10.04 (0.63)	10.07 (0.70)	10.13 (0.86)
Nonuser (n = 415)	–	–	–	–	–	–	9.87 (0.70)	9.99 (0.60)	10.10* (0.54)	10.12 (0.63)	10.16 (0.65)	10.21 (0.63)

Note: Dashes indicate not applicable.

Table 7.5. Descriptive Statistics for the Log of Earnings of Labor Force Participants by Age, Cohort, and Prior-Year Marijuana Use—FEMALES ONLY

	23-25 years	24-26 years	25-27 years	26-28 years	27-29 years	28-30 years	29-31 years	30-32 years	31-33 years	32-34 years	33-35 years	34-36 years
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Cohort 1												
User (n= 120)	9.29 (0.87)	9.54 (0.63)	9.67 (0.66)	9.70 (0.74)	9.75 (0.71)	9.82 (0.75)	–	–	–	–	–	–
Nonuser (n= 512)	9.24 (0.91)	9.45 (0.80)	9.63 (0.63)	9.67 (0.73)	9.74 (0.68)	9.78 (0.70)	–	–	–	–	–	–
Cohort 2												
User (n = 125)	–	–	–	9.42 (0.71)	9.53 (0.69)	9.63 (0.68)	9.71 (0.62)	9.71 (0.64)	9.74 (0.66)	–	–	–
Nonuser (n= 639)	–	–	–	9.42 (0.75)	9.53 (0.79)	9.63 (0.67)	9.71 (0.67)	9.76 (0.67)	9.77 (0.79)	–	–	–
Cohort 3												
User (n = 59)	–	–	–	–	–	–	9.66 ^{***} (0.69)	9.83 ^{***} (0.59)	9.85 ^{**} (0.69)	9.92 ^{**} (0.58)	9.88 (0.93)	9.84 (1.40)
Nonuser (n = 368)	–	–	–	–	–	–	9.42 ^{***} (0.85)	9.55 ^{***} (0.78)	9.60 ^{**} (0.79)	9.71 ^{**} (0.74)	9.76 (0.75)	9.80 (0.81)

Note: Dashes indicate not applicable.

Table 7.6. Descriptive Statistics for the Log of Earnings by Age, Cohort, and Lifetime Cocaine Use—MALES ONLY

	23-25 years	24-26 years	25-27 years	26-28 years	27-29 years	28-30 years	29-31 years	30-32 years	31-33 years	32-34 years	33-35 years	34-36 years
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Cohort 1												
User (n= 291)	9.51 (0.79)	9.69 (0.71)	9.82 (0.63)	9.89 (0.67)	9.89 (0.78)	9.94 (0.75)	–	–	–	–	–	–
Nonuser (n= 569)	9.48 (0.72)	9.70 (0.64)	9.82 (0.61)	9.88 (0.62)	9.92 (0.71)	9.98 (0.71)	–	–	–	–	–	–
Cohort 2												
User (n = 289)	–	–	–	9.73 (0.71)	9.87 (0.64)	9.97 (0.61)	10.01 (0.72)	10.05 (0.64)	10.10 (0.74)	–	–	–
Nonuser (n= 570)	–	–	–	9.77 (0.60)	9.85 (0.66)	9.94 (0.60)	9.99 (0.61)	10.01 (0.72)	10.05 (0.68)	–	–	–
Cohort 3												
User (n = 185)	–	–	–	–	–	–	9.88 (0.67)	9.97 (0.64)	10.06 (0.62)	10.10 (0.70)	10.14 (0.73)	10.17 (0.83)
Nonuser (n = 356)	–	–	–	–	–	–	9.86 (0.68)	9.98 (0.57)	10.08 (0.52)	10.10 (0.59)	10.14 (0.62)	10.20 (0.60)

Note: Dashes indicate not applicable.

Table 7.7. Descriptive Statistics for the Log of Earnings by Age, Cohort, and Lifetime Cocaine Use—FEMALES ONLY

	23-25 years	24-26 years	25-27 years	26-28 years	27-29 years	28-30 years	29-31 years	30-32 years	31-33 years	32-34 years	33-35 years	34-36 years
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Cohort 1												
User (n= 146)	9.46*** (0.78)	9.55 (1.00)	9.79*** (0.60)	9.80** (0.72)	9.88*** (0.61)	9.87** (0.79)	–	–	–	–	–	–
Nonuser (n= 486)	9.18*** (0.92)	9.45 (0.68)	9.58*** (0.64)	9.64** (0.73)	9.70*** (0.71)	9.76** (0.69)	–	–	–	–	–	–
Cohort 2												
User (n = 182)	–	–	–	9.56*** (0.75)	9.65** (0.85)	9.76*** (0.63)	9.84*** (0.62)	9.86*** (0.61)	9.89** (0.68)	–	–	–
Nonuser (n= 582)	–	–	–	9.38*** (0.74)	9.49** (0.74)	9.59*** (0.68)	9.67*** (0.67)	9.71*** (0.68)	9.72** (0.79)	–	–	–
Cohort 3												
User (n = 85)	–	–	–	–	–	–	9.72*** (0.66)	9.85*** (0.58)	9.87*** (0.65)	9.88** (0.68)	9.90 (0.86)	9.85 (1.25)
Nonuser (n = 342)	–	–	–	–	–	–	9.38*** (0.86)	9.53*** (0.79)	9.58*** (0.80)	9.70** (0.73)	9.75 (0.75)	9.79 (0.80)

Note: Dashes indicate not applicable.

multilevel hierarchical data modeling, I decided that individual employees' change in earnings has a straight line trajectory over the year 1988 to 1993:

$$Y_{it} = \delta_{0i} + \delta_{1i}a_{it} + e_{it} \quad [7.3]$$

where $t = 1, 2, 3, 4, 5, 6$, which refers to the years 1988, 1989, 1990, 1991, 1992, and 1993, respectively. The age variable, a_{it} , was defined as $(AGE_{it} - AGE_{i1})$. Therefore, for 1988–1993, a_{it} equals 0, 1, 2, 3, 4, and 5, respectively. Under this specification, δ_{0i} in Equation 7.3 represents the true earning level of person i at the onset of the data collection in 1988.

As ones' earnings may be influenced by the socioeconomic environment in which an employee is positioned, I include the unemployment rate of the area as a control variable in the intra-individual wage-growth equation:

$$Y_{it} = \delta_{0i} + \delta_{1i}a_{it} + \delta_{2i}(\text{UNEMPLOYMENT RATE})_{it} + e_{it} \quad [7.4]$$

where the errors e_{it} are assumed to be independent and normally distributed with common variance σ^2 .

The Level 1 growth model for employee earnings contains two individual growth parameters: an “intercept” parameter representing initial status, and a “slope” parameter representing rate of change.

7.4 Person-Level Model (Level 2)

In adopting hierarchical data modeling, I assume that the growth parameters vary across individuals. In response, I formulated a Level 2 model to represent this variation. For each of the parameters specified in the Level 1 model,

$$\delta_{0i} = \hat{\alpha}_{00} + \sum \hat{\alpha}_{0q} X_{0qi} + r_{0i}$$

$$\check{\delta}_{1i} = \hat{a}_{10} + \Sigma \hat{a}_{1q} X_{1qi} + r_{oi}$$

$$\check{\delta}_{2i} = \hat{a}_{20} + r_{oi}$$

The above Level 2 equations indicate that both the intercept and growth-rate parameters are allowed to vary at Level 2 as a function of measured person characteristics.

7.5 Analysis

Because men and women differ substantially in their alcohol and drug use behavior (Rosenbaum, 1981; Knupfer, 1982; Robbins, 1989), I conducted all of the descriptive analyses of the longitudinal data separately for men and women. I later included gender as a predictor variable in the Level 1 equation of the growth curve model. As variables such as income and job experience can be confounded by age, I conduct the analyses separately for three different age groups. To minimize the influence of skewed data, for example in income distribution, I took the log transformation of earnings.

7.5.1 A Random-Coefficient Regression Model

Equation 7.3 specifies the Level 1 model. At Level 2, I begin with the simplest person-level model:

$$\check{\delta}_{0i} = \hat{a}_{00} + r_{oi}$$

$$\check{\delta}_{1i} = \hat{a}_{10} + r_{oi}$$

This is an unconditional model in that no Level 2 predictors for either $\check{\delta}_{0i}$ or $\check{\delta}_{1i}$ have been introduced. A hierarchical analysis typically begins with the fitting of an unconditional model, because it provides useful empirical evidence for determining a proper specification of the

individual growth equation and baseline statistics for evaluating subsequent Level 2 models. Table 7.9 presents the results of this analysis.

7.5.2 Mean Growth Trajectory

The estimated mean intercept, $\hat{\alpha}_{00}$, and mean growth rate, $\hat{\alpha}_{10}$, for the logarithm of earnings were 9.790 and 0.0939, respectively. In other words, the average logarithm of earnings score at the onset of the longitudinal examination period in 1988 was 9.790 logits, with respondents gaining an average of 0.0939 logits per year until the end of the study period in 1993.

Both the mean intercept and growth rate have large t statistics, which indicates that both parameters are necessary for describing the mean growth trajectory.

7.5.3 Individual Variation in Growth Trajectories

I then considered the nature of the deviations of the individual growth trajectories from the mean curve. The estimates for the variances of individual growth parameters δ_{0i} and δ_{1i} were 0.299 and 0.0145, respectively. Chi-square statistics were used to test the null homogeneity hypothesis that no true variation existed in individual growth parameters. Table 7.9 presents the test statistics for the intercept term of 16637.56 (df=1,491, $p < 0.0001$). This outcome rejects the null hypothesis and supports the alternative hypothesis that respondents vary significantly in their logarithm of earnings in 1988. The corresponding chi-square test statistics for the hypothesis that no individual differences exist among earnings growth rate (i.e., $H_0: \hat{\alpha}_{11} = 0$) was 3636.0 (df=1,491, $p < 0.0001$), which indicates that significant variation exists in earnings growth rates.

The variance estimate $\hat{\alpha}_{11} = 0.0145$ implies an estimated standard deviation of 0.1204. Thus, a respondent whose earnings growth is one standard deviation above average is expected to grow at the rate of $0.0939 + 0.1204$, or 0.2143 logits per year.

The significant variances indicate that substantial variation exists in individual differences regarding initial status and trajectories of employees' earnings. Based on this finding, the following questions emerge: Can alcohol or drug use explain these differences? If yes, to what extent? If no, what variables are the best predictors?

7.5.4 Reliability of Initial Status and Change

Before I go on to expand the between-individual model in order to examine the possible factors associated with the entry earning and earnings growth rate, it is worthwhile to examine the reliability of the δ estimates. Here, for Group 1, the estimated reliabilities for initial status and growth rates were 0.91 and 0.59, respectively (see Table 7.9). The results suggest that the data contain substantial “signal” for detecting differences among subjects in their means with a bit less signal for detecting slope differences. This does not mean that I shall forsake entirely the possibilities of predicting slope difference, because my earlier hypothesis testing revealed statistically significant intersubject heterogeneity on slopes as well as means.

7.6 An Intercept- and Slope-as-Outcome Model

With the Level 1 model specified as Equation 7.3, I now introduce two predictors into the Level-2 model: FEMALE (a dummy variable indicating sex of respondent: 1=female, 0=male); and DKMON88 (a dummy variable measuring the prior-month alcohol use: 1=yes, 0=no). To capture the possibility of their interaction effects, I also include a interaction term DKMONXF (= DKMON88*FEMALE). The person-level model is now

$$\delta_{oi} = \hat{a}_{00} + \hat{a}_{01}DKMON88 + \hat{a}_{02} FEMALE + \hat{a}_{03} DKMONXF + r_{oi}$$

and

$$\delta_{li} = \hat{a}_{10} + \hat{a}_{11}DKMON88 + \hat{a}_{12} FEMALE + \hat{a}_{13} DKMONXF + r_{li}$$

Table 7.8. OLS Regression Coefficients on Log of Earnings by Cohort

	Cohort 1	Cohort 2	Cohort 3
Intercept	9.638*** (0.027)	9.780*** (0.026)	9.828*** (0.035)
TIME	0.0998*** (0.0045)	0.0691*** (0.0042)	0.0683*** (0.0058)
RUNEMP	-0.103*** (0.0087)	-0.0083*** (0.0082)	-0.0663*** (0.011)
R ²	0.061	0.034	0.027

***significant at the 0.001 level.

Note: Cohort 1: respondents who age 23–25 in 1988; Cohort 2: respondents who age 26–28 in 1988; Cohort 3: respondents who age 29–31 in 1988. TIME: = 1, 2, 3, 4, 5, 6 which refer to years 1988, 1989, 1990, 1991, 1992, and 1993. RUNEMP: local area unemployment rate.

Table 7.9. Linear Model of Growth in Log of Earnings of Labor Participants (Unconditional Model)—Cohort 1

Fixed Effect	Coefficient	se	t-ratio	
Mean initial status, \hat{a}_{00}	9.710	0.0148	654.12	
Mean growth rate, \hat{a}_{10}	0.0939	0.0041	23.10	
Random Effect	Variance Component	df	\div^2	p value
Initial status, r_{oi}	0.2993	1491	16637.56	<0.0001
Growth rate, r_{1i}	0.0145	1491	3636.00	<0.0001
Level 1 error, e_{ti}	0.1768			
Reliability of OLS Regression Coefficient Estimate				
Initial status, δ_{0i}	0.910			
Growth rate, δ_{1i}	0.590			

The results (see Table 7.10) imply that female workers earned less than male workers in 1988 by 0.286 logits, that is, $\hat{a}_{02} = -0.286$ with $t = -4.697$. A moderate significant effect was also found for workers' prior-month alcohol use on their earnings ($\hat{a}_{01} = 0.095$ with $t = 1.89$), even after the gender effect on earnings was controlled. Evidence was also found regarding the effect of prior-month alcohol use on earnings, which varies between male and female workers; that is, the interaction terms were not negligible and significant ($\hat{a}_{03} = 0.141$ with $t > 1.96$). This finding suggests that though female workers had lower wages than male workers, females who drank currently had higher wages than females who were not current drinkers. The mean growth rate was 0.0939 ($t = 15.13$), indicating again that there is positive significant earnings growth. Neither gender nor prior-month alcohol use were strongly related to the earnings growth rate. The t ratios were less than 2.00 in both cases.

To test other formal hypotheses of this study regarding the between-person effects on earnings growth rate, I pose the following alternative person-level model:

$$\check{\delta}_{0i} = \hat{a}_{00} + \hat{a}_{01}\text{HGC} + \hat{a}_{02} \text{DKMON88} + \hat{a}_{03} \text{FEMALE} + \hat{a}_{04} \text{JOBEXPE} + \hat{a}_{05} \text{DKMONXF} + r_{0i}$$

and

$$\check{\delta}_{1i} = \hat{a}_{10} + \hat{a}_{11}\text{HGC} + \hat{a}_{12} \text{DKMON88} + \hat{a}_{13} \text{FEMALE} + \hat{a}_{14} \text{JOBEXPE} + \hat{a}_{15} \text{WHITE} + r_{1i}$$

Table 7.11 presents the results for this new intercept- and slope-as-outcome model. The previous significant positive effect of the workers' prior-month alcohol use on their earnings disappeared after the workers' gender, educational level, and number of years of employment were introduced. The results suggest that employees' educational level and the number of years of being employed are the two most important predictors of the employees' current earnings. For each additional year of education, the employees' earnings increased by 0.088 logits ($\hat{a}_{01} = 0.088$, $t = 13.9$) and for each additional year that the employee was employed, the employee's earning would be 0.076 logits ($\hat{a}_{04} = .0764$, $t = 12.6$) higher. Gender remained a significant factor influencing employee earnings. Females earn 0.32 logits ($\hat{a}_{03} = -0.322$, $t = -5.83$) less than males at the tested initial time point. Though no considerable net effect was found on alcohol use, female employees who used alcohol in the prior month tend to earn 0.119 logits times ($\hat{a}_{05} = 0.1186$, $t = 1.88$) more than female employee who abstained from alcohol. After these variables were introduced into the between-subject Level 1 model, the variance component of the intercept ($\check{\delta}_{0i}$) dropped from 0.2993 from the unconditional base model to 0.091, which indicated that 69.6

percent of the variance of the mean log of the earnings at 1988 can be explained by this Level 1 model.

Table 7.10. Linear Model of Growth in Earnings (Effects of Gender and Prior-Month Alcohol Use)—Cohort 1

Fixed Effect	Coefficient	se	<i>t</i> ratio
Model for initial status, δ_{0i}			
Base, \hat{a}_{00}	9.710	0.0145	669.75
DKMON88, \hat{a}_{01}	0.0945	0.0506	1.868
FEMALE, \hat{a}_{02}	-0.286	0.0609	-4.697
DKMONXF, \hat{a}_{03}	0.141	0.0698	2.021
Model for growth rate, δ_{1i}			
Base, \hat{a}_{10}	0.0939	0.0062	15.13
DKMON88, \hat{a}_{11}	0.00032	0.0217	0.015
FEMALE, \hat{a}_{12}	0.00404	0.0260	0.155
DKMONXF, \hat{a}_{13}	0.0143	0.0230	0.478

Table 7.11. Fixed and Random Effects in Linear Growth Model on Earnings with Alcohol Use as Covariate—Cohort 1

Fixed Effect	Coefficient	se	<i>t</i> ratio	
Model for initial status, δ_{0i}				
Base, \hat{a}_{00}	9.7100	0.0131	738.82	
HGC, \hat{a}_{01}	0.0879	0.0063	13.88	
DKMON88, \hat{a}_{02}	0.0471	0.0459	1.03	
FEMALE, \hat{a}_{03}	-0.3220	0.0553	-5.83	
JOBEXYR, \hat{a}_{04}	0.0764	0.0061	12.58	
DKMONXF, \hat{a}_{05}	0.1186	0.0632	1.88	
Model for growth rate, δ_{1i}				
Base, \hat{a}_{10}	0.0939	0.0062	15.15	
HGC, \hat{a}_{11}	0.0104	0.0030	3.48	
DKMON88, \hat{a}_{12}	0.0021	0.0152	0.14	
FEMALE, \hat{a}_{13}	0.0062	0.0129	0.48	
JOBEXYR, \hat{a}_{14}	-0.0138	0.0029	-4.70	
WHITE, \hat{a}_{15}	0.0228	0.0142	1.60	
	Variance			
Random Effect	Component	df	χ^2	p value
Intercept, r_{0i}	0.09104	1486	2297.66	0.000
Growth rate, r_{1i}	0.00012	1486	602.74	>0.500

Deviance = 20356.28 with 3 df

Variance Explained in Initial Status and Growth Rate as a Result of the Above Model Specification		
Model	Initial Status Var(δ_{0i})	Growth Rate Var(δ_{1i})
Unconditional ^a	0.2993	0.0145
Conditional ^b	0.0910	0.00012
Proportion of variance explained	69.60	99.17

a. From Table 7.10

b. These are residual variances based on the model estimated above.

The results do not provide evidence that employees' prior-month alcohol use is related to later earnings growth. Rather, employees' educational background and employment seniority relate significantly to individual earnings growth rates. These two characteristics, however, did not influence the growth rates in the same direction as they did for mean structure of earnings. For each additional year of education, employees earnings increase, on average, 0.0104 logits faster than the earnings of their companions who have one less year of education, holding constant all other variables. This finding is consistent with the hypothesis that employees with higher educational level generally maintain a higher rate of wage growth. The number of years that workers have been employed, however, has a significant negative effect on the earnings growth rates ($\hat{\alpha}_{14} = -0.0138, t = -4.70$). This outcome suggests that wage growth for this young cohort in their mid-twenties to mid-thirties slows for workers who have more years of working experience.

The explanatory power of the HLM model can be reflected by the percentage of the parameter variance explained. Here, the variables specified in the above analysis account for about 70 percent of the parameter variance in the initial earning status, and almost all of the variance in growth rates for employee earnings.

Similar analyses were conducted with daily alcohol use and heavy alcohol use as covariates; no significant effects were seen on either mean earnings or earnings growth.

To investigate whether employees' drug use behavior would have any effects on the earning trajectories, I estimated similar models using employees' marijuana use and cocaine use as predictors in both the Level 1 and Level 2 models. Tables 7.12 and 7.13 present the fixed and random effects in the linear growth model on earnings with employees' prior-year marijuana use and lifetime cocaine use as covariates, respectively.

The results again indicate that education and years employed are the two most important variables explaining the variance of both the earning intercept and the earnings growth rates. It should be noted that employees' prior-year marijuana use showed significant negative association with the earning intercept, or the mean earnings in the initial year of the investigation period (1988). The results indicate that holding gender, education, years employed, and other variables constant, employees who have used marijuana in the prior year have lower earnings than those employees who have not used marijuana in the prior year. Prior-year marijuana use, however, was not found to be significantly associated with employees' earnings growth rates.

Table 7.12. Fixed and Random Effects in Linear Growth Model on Earnings with Prior-Month Marijuana Use as Covariate—Cohort 1

Fixed Effect	Coefficient	se	<i>t</i> ratio	
Model for initial status, δ_{0i}				
Base, \hat{a}_{00}	9.7100	0.0131	737.23	
HGC, \hat{a}_{01}	0.0894	0.0063	14.15	
MJYR88, \hat{a}_{02}	-0.1115	0.0374	-2.98	
FEMALE, \hat{a}_{03}	-0.2846	0.0340	-9.19	
JOBEXYR, \hat{a}_{04}	0.0770	0.0061	12.65	
MJYRXF, \hat{a}_{05}	0.1194	0.0639	1.87	
Model for growth rate, δ_{1i}				
Base, \hat{a}_{10}	0.0939	0.0062	15.15	
HGC, \hat{a}_{11}	0.0105	0.0030	3.51	
MJYR88, \hat{a}_{12}	0.0029	0.0143	0.19	
FEMALE, \hat{a}_{13}	0.0062	0.0128	0.49	
JOBEXYR, \hat{a}_{14}	-0.0138	0.0029	-4.70	
WHITE, \hat{a}_{15}	0.0229	0.0141	1.63	
	Variance			
Random Effect	Component	df	σ^2	p value
Intercept, r_{0i}	0.09215	1486	2307.60	0.000
Growth rate, r_{1i}	0.00012	1486	602.72	>.500

Deviance = 20362.93 with 3 df

Variance Explained in Initial Status and Growth Rate as a Result of the Above Model Specification

Model	Initial Status Var(δ_{0i})	Growth Rate Var(δ_{1i})
Unconditional ^a	0.2993	0.0145
Conditional ^b	0.0922	0.00012
Proportion of variance explained	69.19	99.17

a. From Table 7.10

b. These are residual variances based on the model estimated above.

Table 7.13. Fixed and Random Effects in Linear Growth Model on Earnings with Lifetime Cocaine Use as Covariate—Cohort 1

Fixed Effect	Coefficient	se	<i>t</i> ratio	
Model for initial status, δ_{0i}				
Base, \hat{a}_{00}	9.7100	0.0132	736.85	
HGC, \hat{a}_{01}	0.0904	0.0063	14.29	
COCFLG88, \hat{a}_{02}	-0.0114	0.0368	-0.31	
FEMALE, \hat{a}_{03}	-0.2827	0.0317	-8.93	
JOBEXYR, \hat{a}_{04}	0.0762	0.0061	12.46	
COCFLGXF, \hat{a}_{05}	0.1414	0.0605	2.34	
Model for growth rate, δ_{1i}				
Base, \hat{a}_{10}	0.0939	0.0062	15.15	
HGC, \hat{a}_{11}	0.0104	0.0030	3.48	
COCFLG88, \hat{a}_{12}	-0.0064	0.0138	-0.46	
FEMALE, \hat{a}_{13}	0.0052	0.0127	0.41	
JOBEXYR, \hat{a}_{14}	-0.0136	0.0029	-4.65	
WHITE, \hat{a}_{15}	0.0225	0.0141	1.67	
	Variance			
Random Effect	Component	df	σ^2	p value
Intercept, r_{0i}	0.09242	1486	2309.99	0.000
Growth rate, r_{1i}	0.00012	1486	602.55	>.500

Deviance = 20364.54 with 3 df

Variance Explained in Initial Status and Growth Rate as a Result of the Above Model Specification

Model	Initial Status Var(δ_{0i})	Growth Rate Var(δ_{1i})
Unconditional ^a	0.2993	0.0145
Conditional ^b	0.0924	0.00012
Proportion of variance explained	69.13	99.17

a. From Table 7.10

b. These are residual variances based on the model estimated above.

For this cohort (age 23–25 in 1988), there was no evidence indicating a significant relationship between employees' cocaine lifetime use and both mean earnings in 1988 and earnings growth rates from 1988 to 1993. There was evidence for interaction effects of gender and drug use on the earnings of labor force participants. Female employees who had used marijuana in the prior year or who had ever used cocaine had significantly higher earnings than those female employees who had not used marijuana in the prior year and who have never used cocaine.

Looking at the random effect component, the chi-square test of the variance component associated with the intercept was large and significant, indicating that there was still significant variability around the intercept not explained by the variables introduced in the Level 2 model. The random variance component for the growth rate was small and insignificant, indicating that after education, drug use, gender, working years, and race were included in the model, there was not much variance left to be explainable. Overall, education, drug use, gender, working years, and the interaction of drug use and gender account for about 70 percent of the parameter variance in the initial status, and almost all (99 percent) of the parameter variance in growth rates on the employees' earnings.²⁰

²⁰ Two different versions of R^2 can be computed in HLM: the percentage of total variance explained and the percentage of the parameter variance explained. The latter is presented here because it is more informative in that a part of the total variance is sampling error in δ , which by definition is not explainable by background variables (Bryk & Raudenbush, 1987:155).

Table 7.14 A Summary of Hypotheses Testing Status and Highlights of Findings

Hypotheses Proposed in Chapter 2	Hypotheses Testing—Supported?	Highlights of Findings
Alcohol		<ul style="list-style-type: none"> Holding education received and years staying employed constant, employees’ current alcohol uses are not found to be significant associated with either their earnings or their growth rates on earnings.
H7.1a	No	
H7.1b	No	
Marijuana		<ul style="list-style-type: none"> Holding education received and years staying employed constant, employees’ current marijuana uses are found to be negatively associated with their earnings; However, employees’ current marijuana uses are not found to be significantly related to the growth rates of their earnings.
H7.2a	Yes	
H7.2b	No	
Cocaine		<ul style="list-style-type: none"> Holding education received and years staying employed constant, employees’ lifetime cocaine uses are not found to be significantly associated with either their earnings or the growth rates of their earnings. Female employees who had ever used cocaine in their lifetime would have significantly higher earnings than those female employees who had never used cocaine in their lifetime.
H7.3a	Mixed	
H7.3b	No	
Education		<ul style="list-style-type: none"> Employees with higher education received earlier are not only more likely to have higher initial earnings but also more likely to have higher growth rates on later incomes than other employees.
H7.4a	Yes	
H7.4b	Yes	
Job Experience		<ul style="list-style-type: none"> Employees’ job experience is positively related to their income. Employees’ job experience is not significantly related to their future income growth rate.
H7.5a	Yes	
H7.5b	No	
Others		<ul style="list-style-type: none"> Female employees are found to have significantly lower earnings than male employees; However, there is no evidence to show that the earnings growth rates are different between male employees and female employees.

Note: All the alcohol and controlled drug use variables were measured in 1988; the incomes adopted in this chapter were measured repeatedly from 1988 through 1993.

Source: National Longitudinal Survey of Youth, 1979 - 1993.

7.7 Summary and Discussion

The present study demonstrates the utility of multilevel growth curve modeling techniques for analyses of longitudinal data in the study of employee growth patterns during youth and early adulthood.

In this chapter, I introduced a new analytical approach for investigating the alcohol/drug–income relationship in a longitudinal perspective. In most prior research on individual earnings, the role of individual growth in wage is rarely addressed explicitly. Although researchers have been encouraged to adopt growth curve methodology in one form or another (Rogosa, Brandt, & Zimowski, 1982; Rogosa & Willett, 1985), the appearance of these techniques in the extant literature of sociology, organizational behavior, and substance use has been largely neglected.

Through growth curve methodology, significant variances have been found around the initial mean earning and earnings growth rates. When only gender and current alcohol use were included in the model, current alcohol use showed only a slight significant positive effect on initial earnings, but it had no significant effect on the earnings growth rate. Females were found to have significantly lower earnings than males. However, no difference in earnings growth rate was found between male and female workers.

Because individual trajectories are the proper focus for the analysis of change (Rogosa et al., 1982), the correspondence between the individual growth parameters in this study provides more convincing evidence for their systematic association than does evidence that could be derived from traditional OLS analyses.

Compared to non-heavy drinkers who stay in school to pursue an advanced degree, heavy drinkers will have more labor market experience and higher earnings. If a longitudinal study were conducted on this cohort of individuals, we might find that heavy drinkers have higher initial earnings compared to moderate drinkers and abstainers, simply because heavy drinkers tend to enter the labor market at a younger age. Consistent with this hypothesis, employees with higher levels of education are more likely to have a higher wage growth rate than other employees.

According to the labor market theory of wage compensation, drug users may enter the labor force earlier, and thus may earn more than their peers in their twenties. On the other hand, nonusers of drugs, who usually have higher education levels, may enjoy a faster wage growth rate. My findings support that higher education level is associated significantly and positively not only with initial earnings but also earnings growth. Number of years of prior employment is found to be related positively with the current earnings but negatively with future earnings growth.

It should be noted that even after holding the variables education and years employed constant treating them as pseudo-control variables, as proposed by labor market wage compensation theory, marijuana use is still found to be negatively associated with earnings ($\hat{\alpha}_{02} = -0.112, t = -2.98$). This net negative effect from marijuana use on wage, regardless of education and work experience, calls into attention that the labor market wage compensation theory perhaps needs to be modified to include additional explanatory dimensions when considering drug use and wage—for example, motivation and performance. Physicians and psychologists tend to report that an “amotivational syndrome” is associated with marijuana use (Goldsmith, 1955). From this point of view, marijuana use by employees causally leads to lower earnings by reducing motivation and thus performance. An alternative view is that marijuana use may be an integrated part of the

lifestyle of members of the lower socioeconomic strata (Rubin & Comitas, 1975). However, testing this alternative view is beyond the scope of the present study.

CHAPTER VIII. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

8.1.1 *Unemployment and Employment*

As demonstrated by the descriptive statistics and significance testing explicated throughout this dissertation, employees are generally more likely to be current alcohol users and less likely to be current marijuana users than are unemployed persons. Multivariate analyses, however, indicate that employment status is not significantly related to either prior-month alcohol or heavy alcohol use across all waves of data examined, and that in the 1992 wave, unemployed persons were more than two times as likely to use marijuana in the prior month than employed persons. Several possible explanations come to mind for this negative significant effect of employment status on current marijuana use; First, workplace characteristics associated with employment act as a increasing driving force to curb drug use; second, the anxiety and low self-esteem often associated with long-term unemployment may increase one's tendency to use drugs; third, the emergence and diffusion of the workplace drug control policies have further push effects which exclude certain youthful entrants, i.e, the drug users, from seeking full-time employment or from being employed (Roman & Blum, 1992). As more and more organizations have adopted the drug control policies, this push effect may be more pronounced in the 1992 wave than the previous 1984 or 1988 waves; fourth, there is more clear distinction between the leisure time and the work time for the respondents when they were in the 1992 wave than in the earlier waves, thereby, the employed workers and unemployed persons in the 1992 wave do not converge in their drug use behavior.

8.1.2 Workplace

I draw from two research traditions—the importation and the work stress orientation—to test whether employees’ alcohol and drug use are related to their feelings about their work. Young employees’ attributes unrelated to workplace such as race, marital status, respondent’s education, and father’s education have been persistently found in this dissertation to be associated with alcohol and drug use, justifying the importation perspective to a certain extent. One important conclusion to be reached from the analyses presented here is that some dimensions of the employees’ perceived quality of work life are modestly, but significantly, associated with self-reported alcohol and drug use. This suggests that characteristics of the work environment, along with personal demographic variables, influence work-related drinking, as hypothesized by Trice and Sonnenstuhl (1988), and in more sophisticated ways.

The significant effects of workplace characteristics are not gender invariant. Women who have more years of employment are found to drink more frequently and to be more likely to drink heavily than women workers with fewer years of employment. While perceived opportunity for promotion is found to be a significant risk factor for drug use among male workers, perceived job security is a significant risk factor for drug use among female workers. This pattern supports Kanter’s (1993) thesis²¹ on gender differences in organizational power and promotion opportunity structure. The findings concerning job security and its relation to drug use of employees should be underscored due to the scarcity of literature and empirical investigation of this important phenomenon.

²¹ “It was easier for women to support a culture devaluing hierarchical success because of tradition and because they had few women upward in the hierarchy with whom to identify” (Kanter, 1993:151).

The persistent significant result of job security for female workers in several models raised some interesting and important questions for managers and corporate health policy makers. Is it better for employees to feel moderate rather than low level of job insecurity? Studies on downsizing effects revealed that the relationship between job insecurity and work performance took the form of an inverted-U shape. Moderate job insecurity leads to greater worker performance than low job insecurity (Brockner, 1992). Substance use is known as negatively related to work performance. The relationship between employees' job security and substance use tendency needs further investigation using multiple job security indicator measurements for which this study was lacking.

Investigating the links between structural characteristics of work settings and drinking and drug use behavior promise both theoretical and practical benefits. While many studies focusing on the psychological predispositions or ethical background may help to identify those employees with high risk to be involved in alcohol or drug use, studies of workplace related characteristics have profound policy implications.

8.1.3 Occupation

I have attempted to further clarify the relationship between the macro-occupational characteristics and individual employees' alcohol and controlled drug use. My findings indicate that occupational conditions matter for alcohol use and controlled drug use behavior of employees, but in more complex ways than suggested by much of the organizational stress and occupational subculture literature. Regardless of employees' age, race, gender, educational background, and income level, the macro-level occupational employment security situation maintains an immutable significant negative effect on employees' alcohol use and controlled drug

use, with the exception of heavy alcohol use and cocaine use. This suggests that the economic change may have effects on the psychological well-being of individuals (Tausig & Fenwick, 1999), which in turn influences the individuals' alcohol and drug use behavior. The findings here also indicate that job security at the individual perception level and the larger economic context level may exert different influences on individuals' behavior and future study should benefit by attempting to investigate directly the cross level effects through hierarchical data modeling approaches.

I find that the etiology of cocaine use is different from either alcohol use or other types of drug use, such as marijuana use. While job variety is negatively related to employees' cocaine use, everything else being equal, good physical working conditions are positively associated with cocaine use.

8.1.4 Labor Market Outcomes

Unlike previous studies on drug use and wage increase, I test the lifecycle hypothesis explicitly by utilizing the recently available hierarchical growth-curve modeling technique. Using longitudinal data on employees during their youth and early adulthood between 1988 and 1993, I find significant variances around initial mean earnings, as well as around earnings growth rates. When only "gender" and "current alcohol use" are included in the between-individuals model, current alcohol use shows a slight significant positive effect on the initial earnings, but no effect on the earnings growth rate. In the additional models tested, employees' education level and years employed are found to be the two most important variables explaining the variances of both initial earnings and future earnings growth trajectories. With these variables controlled, employees'

current marijuana use status shows a significant negative association with the earning intercept, but not with the earnings growth rate.

8.2 Implications

Several implications can be derived from this research which examines more or less standard measures of occupational, job-related, and social/demographic characteristics as they influence patterns of drug use of workers in large representative samples of the labor force.

8.2.1 Theoretical Implications

This study refreshes and reconfirms the relationship between social structure and individual personality: that social-structural position affects individual psychological functioning principally through its profound effects on people's immediate impinging conditions of life (Kohn, 1997). The negative relationship between the occupational job variety and individuals' tendency to use cocaine reflects the structural influence on the employees' behavior. The strong positive association between job autonomy and employees' cocaine use before the statistical control and the disappearance of this association after the statistical control suggests that job autonomy and income may be correlated which may in turn influence cocaine use jointly. The persistent positive effect of fathers' highest grade completed on both the male and the female employees' marijuana use behavior also reflect an structural influence. An advantageous class position or a high position in the social stratification hierarchy affords greater opportunity to be self-directed in one's work, which in turn, leads to a high valuation of self-direction for one's self and one's children, greater intellectual flexibility, and a more self-directed orientation to self and society (Kohn, 1969; Kohn et al., 1997).

8.2.2 Public Policy

While there is no agreed-upon answer to the question of whether more severe prohibitions should be introduced in the public policy arena²², the findings in this dissertation suggest that the workplace may act as an independent factor having net effects on employees' drug use behavior. Good public policy and planning may require an overview of the differential distribution of drug problems across and within occupational and organizational subgroups.

In this dissertation, I consider the term “controlled drug use” to have two layers of meaning. First, drug use is controlled because the drugs under investigation are illegal and therefore controlled by the government; second, drug use is “controlled” because most users both conceal their use and know how to use drugs—that is, in a controlled way. The coexistence of these layers and their relationships to society may be studied in a more complex fashion, such as in the context of social change (Parsons & Gerstein, 1977).

8.2.3 Business Policy

Business decisions may be influenced by social forces. While it is mandatory for all federal agencies to establish drug free workplace policies, all federal government contractors are required by the Drug Free Workplace Act of 1988 to maintain drug free workplaces.

This dissertation identifies the drinking and controlled drug use patterns which should benefit the alcohol abuse and controlled drug use preventions. It evaluates, among other things, the structural factors in the workplace that may be reshaped to prevent drinking or drug use patterns considered to be contrary to the objectives of the work or the safety of the employees.

²² Believing that the government should not make personal decisions for the American people, some argue that “prohibition, whether of liquor, cigarettes or drugs, is an immoral policy” (Friedman et al., 1998).

Strategic decisions in the corporate world need to consider multiple elements such as the possible independent influence of firm-level attributes and the fact that employees experience and react differentially to the opportunity structure. The basis for designing workplace intervention or prevention may depend on the relative dominance of occupational or organizational structure and culture in the flow of work activities.

8.3 Limitations

One limitation of this study is potential bias in the information collected, since only self-report measures were used for all variables; concerns about the veracity of the information elicited from these self-reports have drawn great attention from the research community (i.e., GAO, 1993; Turner, Lessler, & Gfroerer, 1992; Zhang, Gerstein, & Johnson, 1998; Zhang, Gerstein, & Johnson, 1999). This study is also limited by the absence of the examination of the mixed effects of the organizational characteristics and the occupational structures.

8.4 Future Studies

In future studies, a complete ideal framework would be a four-level hierarchical model, with the first level being the intra-individual model with repeated longitudinal measures. The second level would be the between-individuals level. Depending on the research target, the third level could be at the organization level, the occupational level, or the industry level. Drug consumption is by no means uniformly distributed (Gerstein & Green, 1993), therefore, the fourth level would be the socioeconomic context level, including the characteristics of the area where the individuals and the organizations are located. The sociological study of alcohol use and controlled

drug use can be further developed by investigating how variables measured at one level, i.e., the occupational unemployment rate, affect relationships occurring at another, i.e., the relationship between the workers' perceived job security and their alcohol and drug use behavior.

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Beach, Florida

APPENDIX A. MEASUREMENT INVENTORY

Alcohol and drug use:

(AFQ88)²³

ALCOHOL FREQUENCY/QUANTITY

- 0 – did not drink in the 30 days before the interview.
1 – drank in the prior 30 days but had no 6 or more drinks in the past 30 days.
2 – had 6 or more drinks once in the past 30 days.
3 – had 6 or more drinks on two occasions in the past 30 days.
4 – had 6 or more drinks on three occasions in the past 30 days.
5 – had 6 or more drinks on four occasions in the past 30 days.
6 – had 6 or more drinks on five occasions in the past 30 days.
7 – had 6 or more drinks on six occasions in the past 30 days.

(DKMON88)

Have you had any alcoholic beverages, including beer, wine, or liquor during the last 30 days?

- 1 yes
0 no

(MJMON88)

Used marijuana or hashish in the prior month. 1 – Yes, 0 – No.

(MJYR88)

Used marijuana or hashish in the prior year. 1 – Yes, 0 – No.

(COCFLG88)

Ever used cocaine in lifetime? 1 – Yes, 0 – No.

(COOCFG88)

of occasions used cocaine in lifetime?

- 0 Never
1 1–2 occasions
2 3–9 occasions
3 10–39 occasions
4 40–99 occasions
5 100 or more occasions

²³ Variable name in parentheses.

(MJOC3088)

During the past 30 days, on how many occasions have you used marijuana or hashish?

- | | |
|---|----------------------|
| 0 | None |
| 1 | 1–2 occasions |
| 2 | 3–5 occasions |
| 3 | 6–9 occasions |
| 4 | 10–19 occasions |
| 5 | 20–39 occasions |
| 6 | 40 or more occasions |

(COOC3088)

During the past 30 days, on how many occasions have you used marijuana or hashish?

- | | |
|---|----------------------|
| 0 | None |
| 1 | 1–2 occasions |
| 2 | 3–5 occasions |
| 3 | 6–9 occasions |
| 4 | 10–19 occasions |
| 5 | 20–39 occasions |
| 6 | 40 or more occasions |

Quality of Employment:

(DISSATIS)

How do you feel about the job you have now? Do you like it very much, like it fairly well, dislike it somewhat, or dislike it very much?

- | | |
|---|-------------------|
| 1 | LIKE VERY MUCH |
| 2 | LIKE FAIRLY WELL |
| 3 | DISLIKE SOMEWHAT |
| 4 | DISLIKE VERY MUCH |

(JS88DANG)

The job (is/was) dangerous.

- | | |
|---|-----------------|
| 1 | NOT TRUE AT ALL |
| 2 | NOT TOO TRUE |
| 3 | SOMEWHAT TRUE |
| 4 | VERY TRUE |

(JS88PAY)

The pay (is/was) good.

- | | |
|---|-----------------|
| 1 | NOT TRUE AT ALL |
| 2 | NOT TOO TRUE |
| 3 | SOMEWHAT TRUE |

4 VERY TRUE

(JS88PROM)

The chances for promotion (are/were) good.

- 1 NOT TRUE AT ALL
- 2 NOT TOO TRUE
- 3 SOMEWHAT TRUE
- 4 VERY TRUE

(JS88SECU)

The job security (is/was) good.

- 1 NOT TRUE AT ALL
- 2 NOT TOO TRUE
- 3 SOMEWHAT TRUE
- 4 VERY TRUE

(JS88SURR)

The physical surroundings (are/were) pleasant.

- 1 NOT TRUE AT ALL
- 2 NOT TOO TRUE
- 3 SOMEWHAT TRUE
- 4 VERY TRUE

(JS88UNHE)

You (are/were) exposed to unhealthy conditions.

- 1 NOT TRUE AT ALL
- 2 NOT TOO TRUE
- 3 SOMEWHAT TRUE
- 4 VERY TRUE

Self-esteem Items:

(SE87)

Now I'm going to read a list of opinions people have about themselves.

HAND CARD T. After I read each one I want you to tell me how much you agree or disagree with these opinions.

1. I feel that I'm a person of worth, at least on an equal basis with others.

Strongly Agree Agree Disagree Strongly Disagree

2. I feel that I have a number of good qualities.

Strongly Agree Agree Disagree Strongly Disagree

3. All in all, I am inclined to feel that I am a failure.

	Strongly Agree	Agree	Disagree	Strongly Disagree
4. I am able to do things as well as most other people.	Strongly Agree	Agree	Disagree	Strongly Disagree
5. I feel I do not have much to be proud of.	Strongly Agree	Agree	Disagree	Strongly Disagree
6. I take a positive attitude toward myself.	Strongly Agree	Agree	Disagree	Strongly Disagree
7. On the whole, I am satisfied with myself.	Strongly Agree	Agree	Disagree	Strongly Disagree
8. I wish I could have more respect for myself.	Strongly Agree	Agree	Disagree	Strongly Disagree
9. I certainly feel useless at times.	Strongly Agree	Agree	Disagree	Strongly Disagree
10. At times I think I am no good at all.	Strongly Agree	Agree	Disagree	Strongly Disagree

*Employment status*²⁴:

Raw Code of Employment Status:

- 1 Employed
- 2 Unemployed
- 3 Out of labor force
- 4 In active forces

²⁴ In chapter 4, only employed and unemployed were included in the analysis. The dummy variable was coded as 1–employed, 0–unemployed; in the all the analyses in the subsequent chapters, only employed persons were included.

APPENDIX B. SAS PROGRAM FOR CONDUCTING THE LOG NEGATIVE BINOMIAL REGRESSION USING THE GENMOD PROCEDURE (MACRO LANGUAGE ADOPTED FROM HILBE, 1994)

```
%macro hilbenb(dsin=, yvar=, xvars=, clsvars=, offvar=, ithist = 0,
              expected = 0 );
* Uncomment the following for a debug trace;
* options mprint;
title Log Negative Binomial Regression ;

* Turn off printing;
%global _print_;
%let _print_ = OFF;
%let maxiter = 50;
%let iter = 1;
%let conv = 0;

%if %upcase(&offvar) ne %then %let offstmt = OFFSET=&offvar;
%else %let offstmt= ;

%if %upcase(&clsvars) ne %then %let clsstmt = %str(CLASS &clsvars;);
%else %let clsstmt= ;

%if(&expected=1) %then %let expstmt = EXPECTED ;
%else %let expstmt= ;

* Data is first modeled using Poisson regression;
proc genmod data=&dsin;
  &clsstmt
  make 'modfit' out=A;
  model &yvar = &xvars / dist = poisson
        &offstmt;
run;

data _NULL_;
  %if( &ithist = 1 ) %then %str(file print;);
  set A;
  if _N_ = 3 then
  do;
    call symput( 'disp', put( valuedf, best10.6 ) );
    %if( &ithist = 1 ) %then
```

```

        %do;
            temp2 = 1/valuedf;
            put 'Iteration number: ' "&iter";
            put 'Pearson Chi2/DF: ' valuedf;
            put 'Alpha: ' temp2;
        %end;

    end;
run;

%let alpha = 1 / &disp;

* Iterate on NB model;
* Iterate until dispersion stops changing;
%do %while( &conv = 0 ) ;
* Data is now modeled using a log-linked negative binomial;
proc genmod data=&dsin;
    &clsstmt
    make 'modfit' out = A;

    _K = &alpha;
    _A = _MEAN_;
    _Y = _RESP_;
    variance _VAR = _A+_K*_A*_A;
    if (_Y>0) then
        _D = 2 * (_Y*log(_Y/_A)-
            (1+_K*_Y)/_K * log((1+_K*_Y)/(1+_K*_A)));
    else if (_Y=0) then _D = 2 * log(1+_K*_A)/_K;
    deviance _DEV = _D;
    model &yvar = &xvars / &offstmt link = log itprint;
run;

%let iter = %eval( &iter + 1 );

data _NULL_;
    %if( &ithist = 1 ) %then %str(file print);
    set A;
    if _N_ = 1 then
        do;
            call symput( 'deviance', put( value, 10.4 ) );
            call symput( 'devdf', put( valuedf, 10.4 ) );
        end;

```

```

if _N_ = 3 then
  do;
    call symput( 'PX2', put( value, 10.4 ) );
    call symput( 'PX2df', put( valuedf, 10.4 ) );

    temp3 = &alpha;
    if ( ABS( valuedf - &disp ) <= 1.e-3 OR &iter > &maxiter )
      then call symput( 'conv', '1' );
    else
      do;
        temp3 = valuedf * temp3;
        call symput( 'disp', put( valuedf, best10.6 ) );
        call symput( 'alpha', put( temp3, best20.10 ) );
      end;
    %if( &ithist = 1 ) %then
      %do;
        put 'Iteration number: ' "&iter";
        put 'Pearson Chi2/DF: ' valuedf;
        put 'Alpha: ' temp3;
      %end;
    end;
  run;
* Print final model;
%if ( &conv = 1 ) %then
  %do;
    proc genmod data=&dsin;
      &clsstmt
      make 'modfit' out = A;
      make 'parmest' out = B;
      _K = &alpha;
      _A = _MEAN_;
      _Y = _RESP_;
      variance _VAR = _A+_K*_A*_A;

      _D = -2 * (_Y*log(_K*_A)-(_Y+1/_K)*log(1+_K*_A)+
        lgamma(_Y+1/_K)-lgamma(_Y+1)-lgamma(1/_K));

      deviance _DEV = _D;
      model &yvar = &xvars / &offstmt &expstmt link = log ;

    run;

  data _NULL_;

```



```

file print;
set A;
if _N_ = 5 then do;
  iter10 = &iter;
  alpha10 = &alpha;
  put 'Number of iterations: ' iter10 10.0 ;
  put 'Alpha:          ' alpha10 10.4;
  put 'Deviance:      ' "&deviance  "
    'Deviance/DF:    ' "&devdf";
  put 'Pearson Chi2:   ' "&PX2  "
    'Pearson Chi2/DF: ' "&PX2df";
  put 'LogLikelihood: ' value 10.4;
end;

run;

%end;

* End DO loop;
%end;
proc print data = B;
  run;

%let _print_ = ON;
title;
options nomprint;
%mend hilbenb;

%hilbenb (dsin=male, yvar= mjoc3088, xvars=age black hispanic marry88 hgc88 hgfather
          jobexyr manual jobmob88 ojs88 js88dang js88pay js88prom
          js88secu js88surr js88unhe se87, offvar=lmonth);
title 'male - mjoc3088';

%hilbenb (dsin=male, yvar= cooc3088, xvars=age black hispanic marry88 hgc88 hgfather
          jobexyr manual jobmob88 ojs88 js88dang js88pay js88prom
          js88secu js88surr js88unhe se87, offvar=lmonth);
title 'male - cooc3088';

%hilbenb (dsin=male, yvar= coocfg88, xvars=age black hispanic marry88 hgc88 hgfather
          jobexyr manual jobmob88 ojs88 js88dang js88pay js88prom
          js88secu js88surr js88unhe se87, offvar=lmonth);
title 'male - coocfg3088';

```

```
%hilbenb (dsin=female, yvar= mjoc3088, xvars=age black hispanic marry88 hgc88  
hgfather
```

```
        jobexyr manual jobmob88 ojs88 js88dang js88pay js88prom  
        js88secu js88surr js88unhe se87, offvar=lmonth);  
title 'female - mjoc3088';
```

```
%hilbenb (dsin=female, yvar= cooc3088, xvars=age black hispanic marry88 hgc88  
hgfather
```

```
        jobexyr manual jobmob88 ojs88 js88dang js88pay js88prom  
        js88secu js88surr js88unhe se87, offvar=lmonth);  
title 'female - cooc3088';
```

```
%hilbenb (dsin=female, yvar= coocfg88, xvars=age black hispanic marry88 hgc88  
hgfather
```

```
        jobexyr manual jobmob88 ojs88 js88dang js88pay js88prom  
        js88secu js88surr js88unhe se87, offvar=lmonth);  
title 'female - coocfg88';
```