

CONSEQUENCES OF MARIJUANA USE FOR DEPRESSIVE DISORDERS

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ABSTRACT

The purpose of this study is to investigate the temporal order in the association between marijuana use and depression. There are two possible hypothesis examined, and for each of them is conducted a separate set of analyses. The dependent variable in the first hypothesis is current depression, predicted by previous and current marijuana use, abuse, and dependence. In the second hypothesis the dependent variables are current marijuana use, abuse, and dependence, predicted by previous and current depression.

To conduct the analyses this study uses data from the National Comorbidity Survey (NCS). The NCS is an epidemiological research study of the prevalence, causes, and consequences of psychiatric disorders and comorbidity, analyzing data from a national sample of 8098 participants covering an age range from 15 to 54 years old.

Results show that prior depression is the main predictor of current depression while marijuana use has a weak effect on current depression. Marijuana users are slightly more depressed than never users, but the lag of the effect is short. There is a strong association between marijuana use and abuse and other drug use and abuse. Findings show that prior marijuana and other drug use and abuse predict current marijuana use and abuse. There is a weak association between current depression and current marijuana use, and when controlled for prior marijuana use this association disappears. The results of this study provide no support for the coping theory. There is a clear pattern of comorbidity of both, mental disorders, and substance use and abuse.

CHAPTER ONE

INTRODUCTION

An abundant scientific literature acknowledges that there is an association between substance use and abuse and psychiatric disorders. Even though there is an increased awareness of the co-occurrence of drug use and abuse and mental health disorders, findings are heterogeneous and show mixed evidence. Many studies agree that drugs, alcohol, and psychological disorders affect each other over time, and users of one drug tend to use other drugs, which contributes to worsened mental health.

Findings regarding temporal order of occurrence could be classified within three categories. The first set of studies supports the idea that use and abuse of marijuana and other drugs precede certain psychological and depressive symptoms. According to the second set of studies, the two kinds of disorder are correlated and affect each other over time, and neither has priority. The third set of studies suggests that it is possible that among people with a history of both mental and substance disorders, psychiatric disorders may lead to substance abuse and dependence through attempts of self-medication.

Scientific literature has confirmed that individuals suffering from different forms of comorbidity of mental health problems and substance use disorders have a higher risk of impairment, disability, and suicide.

The vast majority of research on the psychological effects of marijuana has been done in the context of assessing the drug's intoxicating effects when used for non-medical purposes.

Most of scientific research has shown that marijuana use has negative effects on the overall health. The range of effects includes depressive and other psychological disorders, lung diseases, heart diseases, and a weakened immune system. On the other side, there are findings that show there are some positive effects of marijuana if used for medical purposes to relieve pain and anxiety.

The majority of people who have used marijuana did so first during adolescence, influenced by peer pressure. After alcohol and tobacco, marijuana is the substance most frequently associated with a diagnosis of substance dependence.

Green and Ritter (2000), in their study on marijuana use and depression, found that when marijuana is used to cope with problems, it is associated with increased depression, but when it is used not to cope with problems it is associated with decreased depression. Controlling for other disorder Green and Ritter, include other drug use but they do not look at the effect of other preexisting and current mental disorders.

This study is an attempt to fill the gap in the existing literature on the relation between marijuana use and depression in regard to temporal order. As marijuana and other drug use have been shown to increase the likelihood of psychological disorders, investigation in this area could have implications for the policy of prevention and treatment of these disorders.

CHAPTER TWO

LITERATURE REVIEW

Prevalence of marijuana and other substance use and abuse in the general population.

Alcohol and drug use and abuse in the United States are widespread in the general population.

Warner et al. (1999), using data from the National Comorbidity Survey, found that 51% of the respondents used drugs at some time in their lives, and drug use and dependence are highly prevalent in the general population.

Statistics from the National Household Survey on Drug Abuse published in the year 2000 show that about 14.8 million Americans were current users of illicit drugs in 1999, which means that they used an illicit drug at least once during the 30 days prior to the interview. The survey found that 10.9 % of youths aged 12-17 and 17.1 % of young adults aged 18 to 25 were current users of illicit drugs in 1999 (<http://www.Samhsa.gov>).

NCADI's statistics show that marijuana is the most commonly used illicit drug in the United States. In 1998 approximately 81% of current illicit drug users were marijuana/hashish users, and also an estimated 11.0 million Americans were current (past month) marijuana/hashish users. About 8.3% of the youths age 12-17 were current marijuana users in 1998. The prevalence of current marijuana use among youths more than doubled from 1992 to 1995 from 3.4% to 8.2%. Since 1995 the rate has fluctuated, but it was about the same in 1998 as it was in 1995. In 1998 there were an estimated 6.8 million (3.1 % of the population age 12 and older) frequent marijuana users, which is

defined as use on at least 51 days during the past year

(<http://www.health.org/govstudy/htm>).

Whites report greater lifetime experience with marijuana (35.6%) than blacks (30.7%) or Hispanics (28.1%). However, blacks (10.4%) and Hispanics (9.6%) report greater past year prevalence rates of marijuana use than whites (8.8%).

There are gender differences also, as males consistently report higher prevalence rates (40.7%) than females across the lifetime (30.8%), past year (11.3% vs. 6.4%), and past month (5.9% vs. 2.7%).

Considering location, the western part of the country has consistently shown higher prevalence of marijuana use than the other regions of the country (<http://www.health.org/govstudy/htm>).

Prevalence of depressive and mental disorders.

Mental disorders are common in the United States and internationally. Statistics from the National Institute of Mental Health show that an estimated 44.3 million people in the United States or 22.1% of the population of ages 18 and older, suffer from a diagnosable mental disorder in a given year. In the United States, 4 of the 10 leading causes of disability are mental disorders: major depression, bipolar disorder, schizophrenia, and obsessive-compulsive disorder. Many people suffer from more than one mental disorder at a given time (<http://www.nimh.nih.gov/publicat/stats.cfm>).

Approximately 18.8 million Americans, or about 9.5 % of the U.S. population age 18 and older, suffer from a depressive disorder, in a given year. About twice as many women, 12.4 million (12.0%) as men, 6.4 million (6.6 percent) are affected by a

depressive disorder each year in the United States

(<http://www.nimh.nih.gov/publicat/stats.cfm>).

Affective disorders include major depressive disorder, dysthymic disorder, and bipolar disorder. Approximately 9.9 million American adults, or about 5.0% of the U.S. population age 18 and older, are affected by major depressive disorder, in a given year. Almost twice as many women, 6.7 million (6.5%) as men, 3.2 million (3.3%) suffer from major depressive disorder each year. (<http://www.nimh.nih.gov/publicat/stats.cfm>).

Dysthymic disorder affects approximately 10.9 million American adults, 5.4% of the U.S. population age 18 and older, during their lifetime. About 40 % of adults with dysthymic disorder also meet criteria for major depressive disorder or bipolar disorder in a given year (<http://www.nimh.nih.gov/publicat/stats.cfm>). Bipolar disorder affects approximately 2.3 million American adults or about 1.2% of the U.S. population age 18 and older in a given year. Men and women are equally likely to develop bipolar disorder (<http://www.nimh.nih.gov/publicat/stats.cfm>).

Statistics from a study using the National Comorbidity Survey by Kessler et al. 1996, showed that 58.0% of the NCS respondents with lifetime depression have had an anxiety disorder, 38.6% had a substance use disorder, and 74% had one or more disorders. Also, 31.9% of people with lifetime depression have had three or more other lifetime disorders (Kessler et al. 1996).

Prevalence of comorbidity of substance use and psychiatric disorders

Merikangas et al. (1998) in a cross-national investigation of patterns of comorbidity of substance use and psychiatric disorders reported the results of

epidemiological studies from the United States and Western Europe. Drug use/dependence was strongly linked to depression in all of the studies. They found that across all sites there was a strong and consistent association between conduct disorder and alcohol disorders, and between antisocial personality disorder and alcohol disorders. For all sites they investigated in their study, mood disorders were found to be significantly associated with drug use, drug problems, and dependence. The same pattern emerged for any anxiety disorder comorbid with drug use disorders at all levels of severity. They pointed out that the magnitude of comorbidity with psychiatric disorders was greater for drug disorders than for alcohol disorders. Moreover, the direct relationship between comorbidity and severity of substance problems was far more pronounced for drugs than for alcohol. The results of their study showed that there is a direct relationship between the number of mood/anxiety disorders and the magnitude of comorbidity with substance disorders. They found that there is an association between the number of anxiety or mood disorders and the severity of drug disorders (Merikangas et al. 1998).

Using data from the National Comorbidity Survey Kessler et al. (1996) concluded that mental disorders are consistently more strongly related to dependence on drugs than to drug abuse. Their data showed that 41.0% - 65.5% of respondents with a lifetime addictive disorder also have a lifetime history of at least one mental disorder, while 50.9% of those with one or more lifetime mental disorders have a lifetime history of at least one addictive disorder (Kessler et al. 1996). Using the same survey Kessler et al. (1997) found that respondents with lifetime alcohol abuse or dependence had a high probability of carrying at least one other lifetime diagnosis. Prior psychiatric disorders

are more powerful predictors of subsequent alcohol dependence than is alcohol abuse. The authors suggest that the majority of the prior depressive disorders are stronger predictors of alcohol abuse among women than among men (Kessler et al. 1997).

Swendsen et al. (1998) found that there was strong cross-site consistency in the magnitude and specific patterns of comorbidity. Individuals with alcohol abuse or dependence generally experienced a twofold to threefold increased risk of anxiety and depressive disorders. Phobic conditions typically preceded the onset of alcoholism, but no systematic pattern was observed for panic or depressive disorders. While the presence of comorbid anxiety or depressive disorders was consistently associated with moderate increases in the symptoms of alcohol abuse or dependence, alcoholism was associated with large increases in the number of depressive symptoms and with little or no increase in phobic symptoms (Swendsen et al. 1998).

Comorbidity with drug abuse occurring first.

Hansell and White (1991) found in a longitudinal study that there is not much support for the idea that adolescents use drugs to cope with pre-existing psychological symptoms. In contrast, they found that general drug use contributes to psychological and physical symptoms over time. In a sample of adolescents, results showed that those with relatively higher levels of physical symptoms and psychological distress do not have especially high risk of initiating or maintaining general drug use. Their findings support the argument that adolescents do not use drugs to cope with distress and symptoms. They conclude that general drug use impairs psychological and physical health and also that

physical symptoms and psychological distress affect each other over time (Hansell and White 1991).

The results of a study by Brook, Richter and Rubenstone (2000), show that drug use and abuse increase the likelihood of psychiatric disorders. The objective of this study was to examine the temporal priority in the relationship between psychiatric disorders and drug use. A significant relationship was found to exist between earlier adolescent drug use and later depressive disorders in young adulthood, and not caused by earlier psychiatric disorders. Psychiatric disorders did not predict changes in young adult drug use (Brook, Richter and Rubenstone, 2000).

Gove, Geerken, and Hughes (1979) concluded in a study on drug use and mental health concluded that in general, users of any drug have a higher probability of using each of the other drugs than do non-users of that drug. Another important finding was that use of drugs is strongly related to the experience of psychiatric symptoms, but it is only weakly related to low positive affect. The greater the diversity of drugs which are used, the worse the mental health of the user, and relationships are additive rather than interactive (Gove, Geerken and Hughes, 1979).

Merikangas et al. (1998) found in a study on comorbidity that with the exception of drug dependence, the onset of mood disorders tended to postdate drug disorders. But across all sites, the onset of anxiety disorders preceded that of alcohol and drug disorders at nearly all levels of severity of substance use disorders (Merikangas et al. 1998).

Comorbidity with mental disorders occurring first.

Kessler et al. (1996) in a study using NCS data, found that among people with a history of both a mental and addictive disorder, the mental disorder usually occurs first. “But”, they state, “the only instances in which primary addictive disorders are more likely than mental disorders to occur first involve co-occurring affective disorders and alcohol use disorders among men” (Kessler et al. 1996).

In another study using the NCS data, Kessler et al. (1997) found a significant difference between men and women regarding temporal order of alcohol abuse and mental disorders. They found that men are more likely to report their alcohol abuse as either pure (which means not associated with another disorder) or temporally primary, but women are more likely to report it as either the same year or temporally secondary.

Johnson and Kaplan (1990), found that continual daily drug use was significantly related to early psychopathologic symptoms (Johnson and Kaplan 1990).

Drug use and psychological disorders have a negative effect on each other over time.

Some of the findings of Dembo et al. (1992) were that emotional and psychological problems were significantly associated with reported adverse effects of the use of alcohol or marijuana or hashish. Youths who become more involved in the use of alcohol or marijuana or hashish over time report more adverse effects of their use of each of these substances. Compared with white males, black male youths reported fewer adverse effects resulting from their use of alcohol and marijuana or hashish, and had fewer emotional and psychological problems (Dembo et al. 1992).

Green and Ritter (2000) found that marijuana users who use the drug to cope with problems are more depressed than those who do not use to cope with problems (Green, Ritter 2000).

Johnson and Kaplan's (1990) findings indicate that using drug to cope increases later symptoms. The model they used in the study showed that particularly for emotional distress, drug use is an ineffective coping mechanism which increases later symptoms. Following drug use, adult white females and males report significantly higher levels of depressive symptoms than do nonwhite adults after earlier symptomatology is controlled (Johnson and Kaplan 1990).

Gender differences.

There is some agreement concerning gender differences as studies have shown that there is a difference between females and males in the patterns of substance abuse and psychological disorders. One of the results is that the magnitude of comorbidity tends to be greater for females, particularly at lower levels of substance abuse (Merikangas et al. 1998). Stein et al. (1987) found that there is a significant gender difference in young adult alcohol use, with male subjects drinking more often. Brook et al. (1999) concluded that gender of the subject was a significant factor, with boys more likely to initiate marijuana use than girls. Kessler et al. (1999) maintain that males are significantly more likely than females to report lifetime and 12 month use and dependence. Kessler et al. (1997) suggest that earlier disorders are generally stronger predictors of alcohol and drug dependence among women than among men. The findings of this NCS study are consistent with previous research concluding that males are more likely than females to

use and to be dependent on drugs. There are significant gender differences in the retrospective temporal ordering of alcohol abuse and other disorders, with men more likely to report their alcohol abuse as either pure (not associated with any other disorder) or temporally primary to mental disorders, and women are more likely to report it as either the same year or temporally secondary to mental disorders (Kessler et al. 1997).

Galaif et al. (1996) show that females reported significantly higher levels of depression than males. Although males reported using slightly higher levels of all substances as compared to females, the only significant difference was for self-reported cigarette use (Galaif et al. 1996).

Age of first marijuana use.

Even though age of marijuana initiation is considered to be an important factor to be considered, findings of the psychological consequences regarding the age of initiation are heterogeneous. Brook et al. (1999) concluded that age is a significant factor in marijuana initiation. They found that adolescents are more likely to initiate marijuana use followed by young adults, preadolescents and early adolescents. Marijuana use peaked at age 17 and then decreased thereafter (Brook et al. 1999).

Green and Ritter (2000) found in their study on marijuana use and depression that early marijuana use is weakly associated with increased depression in adulthood. They suggest that adult frequency of marijuana use is not significantly associated with increased depression in adulthood. Their findings support that when they controlled for other drug use the effect of age of first marijuana use on depression diminished (Green, Ritter 2000).

Marijuana use and depression

As mentioned above, findings regarding the effect of marijuana use and abuse on depression are heterogeneous. Green and Ritter (2000) concluded that early marijuana users and later marijuana users are slightly more depressed than those who have never used marijuana. The effect of initiating marijuana use later than age sixteen is diminished to nonsignificance when controlled for other drug use. The effect of age of marijuana initiation, both early and later as compared to those who have never used, diminishes noticeably when other drug use is statistically controlled. They state that when marijuana is used to cope with problems it is associated with increased depression, but when it is used not to cope with problems it is associated with decreased depression (Green and Ritter 2000).

STATEMENT OF THE PROBLEM

As mentioned earlier, despite the fact that many studies on substance abuse have shown high rates of coexisting mental disorders, the temporal order of the occurrence has not been well established. A better understanding of the temporal order could have an important impact on prevention and treatment of substance and mental disorders.

In their study of marijuana use and depression Green and Ritter (2000) conclude that marijuana use has only a weak impact on depression and this is confined to those who initiate marijuana use early. Another finding is that those who use marijuana to cope with problems have worse mental health. But coping is measured only by one question and the answers given by the respondents may be biased. Those in present good mental health might not recall the early events.

The purpose of this study is to find the association between marijuana use and depression with regard to temporal occurrence, controlling for previous depressive disorders.

Research indicates that marijuana users tend to also use other drugs. Considering this fact, this research will control for the effect of use of other drugs on depression.

In their study Green and Ritter (2000) do not control for pre-existing and current other mental disorders. The current study will control for pre-existing and current other mental disorders and their effect on depression.

The study will reveal also if there are gender differences in temporal order of the occurrence of marijuana use and depressive disorders.

THE IMPORTANCE OF THIS STUDY

As mentioned above, marijuana is the most widely used illicit drug in the United States. Johns and Heaven (1998) in their study with a sample of Australian high school students found marijuana use to have the highest level of perceived peer approval.

Stein, Newcomb, and Bentler (1987) stated that from a behavioral perspective, prior drug use is one of the most powerful predictors of future drug use (Stein, Newcomb, and Bentler 1987).

Borges et al. (2000), found that alcohol and drug use predicts subsequent suicide attempts after controlling for sociodemographics and comorbid mental disorders.

Substance users are at a significantly higher risk of subsequent first occurrences of suicide attempts than nonusers.

As marijuana and other substance use and abuse have shown to increase the likelihood of psychological disorders, suicide attempts, and other disruptive behavior, investigation in this area could have implications in the policy of prevention and treatment of these disorders.

CHAPTER THREE

DATA AND METHODS

This study was conducted using secondary data obtained from the National Comorbidity Survey (NCS). The NCS is an epidemiologic research of the prevalence, causes, and consequences of psychiatric disorders and comorbidity in the United States. It is conducted by the Survey Research center at the University of Michigan. The survey took place from September 14, 1990 until February 6, 1992. Participant selection was based on a stratified, multistage area probability sample. The sample included a total of 8098 noninstitutionalized civilians in the US from the 48 coterminous states, covering an age range from 15 to 54 years old. An additional sample of students living on campus was also included in the NCS survey. The response rate of NCS was 82.6%. The lower limit of respondents' age of 15 years was chosen in order to minimize the recall bias of early-onset disorders. Respondents older than 54 years were excluded as the ECA study had shown that active comorbidity between substance use disorders and psychiatric disorders is much lower among people older than 54 years.

Initially, there were 8098 participants in the survey. A supplemental nonresponse survey was carried with the subjects that did not respond to the main survey. This sample of initial nonrespondents showed to have a higher rate of psychiatric disorders.

There are three adjustment weights used in the NCS survey. The first adjustment weight is used to compensate for the systematic nonresponse in the main survey data. The second weight was used in order to adjust for variation in probabilities of selection within and between households. The third weight was used to adjust the data to approximate the

national population distributions of the cross-classification of demographics such as age, race/ethnicity, sex, marital status, education, living arrangements, region, and urbanicity.

The psychiatric diagnoses used in the NCS survey are based on the Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition (DSM-III-R). The NCS used an adjusted version of the Composite International Diagnostic Interview (CIDI) for the diagnostic interviews in the NCS. CIDI is a highly standardized diagnostic interview used to assess mental disorders based on the definitions and criteria of ICD-10 and DSM-III-R.

Wittchen (1994) in a review on reliability and validity of CIDI, mentioned that CIDI solved many reliability problems faced with DIS (Diagnostic Interview Schedule). In order to assess the diagnoses were used two independent interviewers were used. This provides a high degree of consistency and reliability.

The advantages and accuracy of using data from the NCS survey as compared to other surveys, consist of the following : The NCS is the first survey that interviewed a representative national sample in the United States and conducted a structured psychiatric interview. Compared to the ECA (Epidemiologic Catchment Area Study) which has been the main source of data in the United States on the prevalence of psychiatric disorders, the NCS goes beyond ECA and is a more advanced survey. Comparing the two studies the ECA is a prevalence and incidence study and the NCS includes also the risk factor. Diagnoses in the ECA are based on DSM-III, while the NCS are based on DSM-III-R. The ECA included institutional respondents, and they had a small number of local samples, while the NCS is conducted in a national sample.

DEFINITIONS OF USE, ABUSE, AND DEPENDENCE

The use of certain substances and under certain circumstances in American culture is considered as acceptable and normal behavior. In some groups, even the use of some illegal substances has become acceptable. Meanwhile, there is a very wide and diverse cultural variation on the acceptance in different cultures for different substances.

In this study the term use refers to recreational drinking of moderate amounts of alcohol, and moderate use of other substances. (DSM-III-R, 1987).

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R) the diagnostic criteria for psychoactive substance abuse consists of the following: “1. A maladaptive pattern of psychoactive substance use indicated by at least one of the following:

- (a) continued use despite knowledge of having a persistent or recurrent social, occupational, psychological, or physical problem that is caused or exacerbated by use of the psychoactive substance.
 - (b) recurrent use in situations in which use is physically hazardous.
2. Some symptoms of the disturbance have persisted for at least one month, or have occurred repeatedly over a long period of time.
3. Never met the criteria for Psychoactive Substance Dependence for this substance” (DSM-III-R, 1987).

While the diagnostic criteria for psychoactive substance dependence as defined in the DSM-III-R is:

- A. “1. Substance often taken in larger amounts or over a longer period than the person intended”.

2. persistent desire or one or more unsuccessful efforts to cut down or control substance use.
3. A great deal of time spent in activities necessary to get the substance, taking the substance, or recovering from the effects.
4. Frequent intoxication or withdrawal symptoms when expected to fulfill major role obligations at work, school or home, or when substance is physically hazardous.
5. Important social, occupational and recreational activities given up or reduced because of substance use.
6. Continued substance use despite knowledge of having a persistent or recurrent social, psychological or physical problem that is caused or exacerbated by the substance use.
7. Marked tolerance: need for markedly increased amounts of the substance in order to achieve intoxication or desired effect, or markedly diminished effect with continued use of the same amount.
8. Characteristic withdrawal symptoms
9. Substance often taken to relieve or avoid withdrawal symptoms.

According to DSM-III-R criteria a person should meet three of the above for substance dependence.

B. Some symptoms of the disturbance symptoms have persisted for at least one month, or have occurred repeatedly over a long period of time (DSM-III-R, 1987).

As I have mentioned in chapter two, affective disorders include major depressive disorder, dysthymic disorder, and bipolar disorder. In this study, the term “depression” refers to major depressive disorder.

DEPENDENT VARIABLES

There are four dependent variables in this study:

Current depression: depression in the 12 months prior to the interview (dependent variable in the first hypothesis).

Current marijuana use: marijuana use in the past 12 months prior to the interview (dependent variable in the second hypothesis).

Current marijuana abuse: marijuana abuse in the past 12 months prior to the interview (dependent variable in the second hypothesis).

Current marijuana dependence: marijuana dependence in the past 12 months prior to the interview (dependent variable in the second hypothesis).

INDEPENDENT VARIABLES

There are eight independent variables in this study. The variables are:

- Previous marijuana use, current marijuana use, previous marijuana abuse, current marijuana abuse, previous marijuana dependence, current marijuana dependence (independent variables in the first hypothesis).

- Previous depression, current depression (independent variables in the second hypothesis).

CONTROL VARIABLES

There are thirteen control variables: previous depression (lifetime), previous marijuana use (lifetime), previous marijuana abuse (lifetime), previous marijuana dependence (lifetime), any other drug use lifetime, any other drug abuse and dependence

lifetime, any other mental disorder lifetime, age, education, income, employment, marital status, and gender.

The variable previous depression (lifetime) in this study refers to lifetime depression where the depression onset is before past year.

The variable previous marijuana use lifetime in this study refers to lifetime marijuana use where the marijuana use onset is before past year.

The variable previous marijuana abuse lifetime in this study refers to lifetime marijuana abuse where the marijuana abuse onset is before past year.

The variable previous marijuana dependence lifetime in this study refers to lifetime marijuana dependence where the marijuana dependence onset is before past year.

The variable previous depression refers to major depressive episode occurrence that was more than a year ago prior to the interview.

The variable current depression refers to major depressive episode occurrence in the past 12 months prior to the interview.

The variable previous marijuana use refers to last time marijuana use occurrence that was more than a year ago prior to the interview (met the DSM-III-R criteria for marijuana use).

The variable current marijuana use refers to last time marijuana use occurrence in the past 12 months prior to the interview (met the DSM-III-R criteria for marijuana use).

The variable previous marijuana abuse refers to marijuana abuse occurrence that was more than a year ago prior to the interview (met the DSM-III-R criteria for marijuana abuse).

The variable current marijuana abuse refers to marijuana abuse occurrence in the past 12 months prior to the interview (met the DSM-III-R criteria for marijuana abuse).

The variable previous marijuana dependence refers to marijuana dependence occurrence that was more than a year ago prior to the interview (met the DSM-III-R criteria for marijuana dependence).

The variable current marijuana dependence refers to marijuana dependence occurrence in the past 12 months prior to the interview (met the DSM-III-R criteria for marijuana dependence).

The variable age is measured by four categories: from 15-24 years, 25-34 years, 35-44 years, 45-54 years old. The education variable is also measured by four categories: 0-11, 12, 13-15, 16+ years of education. Employment has also four categories where respondents are identified as follows: homemaker, other – where other includes the unemployed, those looking for work, retired, permanently disabled and other; worker-including those working also temporarily laid-off and on sick leave; and student category.

The income variable in this study is also measured by four categories: Income of \$0-\$19,999; \$20,000-\$34,999; \$35,000-\$69,999; \$70,000+. While marital status is identified by three categories: married (including cohabiting), never married, and separated or widowed. Finally gender of the respondents is measured by two categories, male and female.

Marijuana use is measured by asking the respondents if they have ever used marijuana in their life. While marijuana abuse and dependence are measured by the criteria issued in the DSM-III-R (as noted above). Twelve month diagnoses of marijuana use, abuse, and dependence was measured in the subsample of respondents who qualified

for the lifetime diagnosis and who reported at least one DSM-III-R symptom in the 12 months prior to the interview.

ANALYSIS

The data in this study are analyzed using the logistic regression method. For the regression analysis I used the SUDAAN software package as it offers a better estimation of the standard errors. (Ref. to: Shah B.V., Barnwell B.G. and Bieler G.S. 1997, SUDAAN user's manual release 7.5. Research Triangle Park NC: Research Triangle Institute).

The weight used in this study is P1FWT that is used to analyze Part I variables (n=8098). Table 1 presents the characteristics of the sample. Table 2 shows the results of logistic regressions for current depression predicted by marijuana use. Table 3 presents the results for current depression predicted by marijuana abuse. Table 4 gives the results of logistic regressions for current depression predicted by marijuana dependence. The next three tables show respectively the results for: Table 5 current marijuana use predicted by depression, Table 6 current marijuana abuse predicted by depression and Table 7 current marijuana dependence predicted by depression.

Table 1: Characteristics of the sample.

Variable name	N	%	Standard Deviation
AGE			
Ages 15-24	1769	21.8	0.41
Ages 25-34	2632	32.5	0.47
Ages 35-44	2242	27.7	0.45
Ages 45-54	1455	18.0	0.38
EDUCATION			
0-11years of education	1474	18.2	0.39
12 years of education	2679	33.1	0.47
13-15 years of education	2132	26.3	0.44
16 or more years of education	1813	22.4	0.42
INCOME			
Income \$0-\$19999	2344	28.9	0.45
Income \$20,000-\$34,999 per year	2031	25.1	0.43
Income \$35,000-\$69,999 per year	2722	33.6	0.47
Income more than \$70,000 per year	1001	12.4	0.33
EMPLOYMENT STATUS			
Employment status: homemaker	719	8.9	0.28
Employment status: other	560	6.9	0.25
Employment status: student	840	10.4	0.30
Employment status: worker	5979	73.8	0.44
MARITAL STATUS			
Married or Cohabiting	4410	54.5	0.50
Never married	2435	30.1	0.46
Separated, widowed, divorced	1253	15.5	0.36

GENDER

Gender: Male	3847	47.5	0.50
Gender: Female	4251	52.5	0.50

OTHER VARIABLES

Past year depression w/o hierarchy	836	10.3	0.30
Previous Marijuana use	3098	38.3	0.4860
Current Marijuana use	848	10.5	0.3062
Previous Marijuana abuse	549	6.8	0.2514
Current Marijuana abuse	147	1.8	0.1335
Previous Marijuana dependence	738	9.1	0.2878
Current Marijuana dependence	233	2.9	0.1672
Previous marijuana use (lifetime)	3925	48.5	0.4998
Previous marijuana abuse (lifetime)	692	8.5	0.2796
Previous marijuana dependence (lifetime)	345	4.3	0.2020
Previous depression	1296	16.0	0.3667
Previous depression (lifetime)	620	7.7	0.2659
Any other drug use lifetime	2531	31.3	0.4636
Any other drug abuse and dependence lifetime	2134	26.4	0.4406
Any other mental disorder lifetime	2839	35.1	0.4772

Characteristics of the sample.

Table 1 presents some descriptive statistics of the sample. The sample is representative of the United States population. In the first part of the survey, there were 8098 respondents. In the second part of the survey, there were 5877 respondents interviewed. In this study, are analyzed data from the first part of the survey. From figures in the above table, we see that regarding the age variable, the sample is well proportioned in four age groups where

the highest percentage, 32.5%, are 25-34 years old. Considering education, the highest percentage, 33.1%, have 12 years of education. With regard to income, the highest percentage of the sample, 33.6%, fall in the range of \$35,000-\$ 69,999 annual income and only 12.4% belong to the \$70,000 or more group. An overwhelming 73.8% of the sample is in the working category. While the married and cohabiting category has 54.5% of the sample's population. With regard to gender the sample is about split in half (52.5% women and 47.5% men).

In the sample, 48.5% started to use marijuana before the past year, and 10.5% used marijuana in the last year. We see that 10.5% had a depression episode occurrence in the past year, while for 38.3% the last time they used marijuana was more than a year ago. With regard to substance use, 31.3% of the sample have used other drug at least once in their lifetime, while 26.4% abuse and are dependent on other drugs in their lifetime, and 35.1% suffer from other mental disorder in their lifetime.

CHAPTER FOUR

FINDINGS AND ANALYSIS

The main question this study is aiming to answer is: what is the temporal relationship between marijuana use and depression. The existing literature reviewed for this study indicates findings that could be classified in three main categories. The first category supports that it is prior marijuana use that leads to depression. The second category of findings supports that it is prior depression that causes people to use marijuana. And the third category supports that marijuana use and depression are correlated and they affect each other over time without establishing a temporal priority.

Based on this classification, analyses are conducted for two possible hypotheses for the relationship between marijuana use and depression. The first hypothesis aims to find if prior marijuana use causes depression, and the second hypothesis attempts to find if preceding depression causes people to use marijuana.

The variables used in the first hypothesis are current depression as dependent variable, predicted by previous marijuana use and current marijuana use, as independent variables. In a second and third phase of the analyses, previous marijuana abuse and dependence, and current marijuana abuse and dependence are the independent variables, while the dependent variable is current depression for the three phases of the analyses. Step by step control variables are included in the regression analyses starting with previous depression (lifetime) followed by the demographic variables.

In the second hypothesis, the dependent variables are current marijuana use, abuse and dependence, each of them predicted by current depression and previous depression as independent variables. Analyses continue including step by step the control variables, in

this case previous marijuana use (lifetime), abuse (lifetime), and dependence (lifetime), and also controlling for the other demographic variables.

The first hypothesis: Models of marijuana involvement predicting depression

Current depression predicted by marijuana use (Table 2)

Model 1: Previous and current marijuana use

Table 2 presents the results of the logistic regressions for current depression predicted by marijuana use. In this step of the analysis, the relationship between current depression (dependent variable) and previous marijuana use and current marijuana use (independent variables) is examined. The results show that both categories, those who currently used marijuana and those who previously used marijuana are more depressed than never users, ($p < .001$) where those who currently used marijuana are more depressed than those who previously used marijuana ($p < .001$).

Model 2: Previous depression (lifetime)

From this analysis we see that when previous depression (lifetime) is included as a control variable it becomes the main predictor of current depression and the result is statistically significant, ($p < .001$) while the effect of current marijuana use is less but still significant (.05). Previous marijuana use, in this case, shows to be associated current decreased depression and the result is statistically significant.

Model 3: Other mental and drug disorders

In the third step of the analyses, three control variables, any other lifetime drug use (excluding marijuana), any other lifetime mental disorder (excluding depression), and any other lifetime drug abuse or dependence (excluding marijuana) are included. Previous depression (lifetime) remains significantly ($p < .001$) the main predictor of current depression but this time with less effect. Again, current marijuana use is associated with current increased depression. Also, other mental disorders are associated with current increased depression, and the result is statistically significant ($p < .001$). While for any other drug use, and any other drug abuse and dependence, we see that there is an association with current depression, but the coefficients are not statistically significant.

Model 4: Age, Education, Employment, Income, Marital status, and Gender

In the next analysis six control variables are included: gender, age, education, income, employment status, and marital status. Findings show that older subjects are less depressed than younger ones, and the results for education reveal that subjects with more education are less depressed, and both these relationships are statistically significant. The association between previous depression and current depression becomes stronger and it is significant ($.001$). Interestingly, the income group of \$35,000-\$69,999 shows to be less depressed than any other income group but this relation is not statistically significant. Also, similar to other studies, we see that women are more depressed than men. Never married and the divorced and widowed are more depressed than the married and

cohabiting category. Unemployed subjects are more depressed than those in the other categories ($p < .01$).

Model 5: Other mental and drug disorders + Age, Education, Employment, Income, Marital status, and Gender

The final step examines the relationship between current depression as the dependent variable and current marijuana use and previous marijuana use as independent variables, including all above mentioned control variables in one analysis. In this step findings show the same pattern where previous depression (lifetime) remains the strongest predictor ($p < .001$) of current depression and any other mental disorder is associated with current increased depression. The unemployed are more depressed than those in the other categories ($p < .001$), while women are more depressed than man ($p < .05$). Education is associated with decreased depression. Subjects with more education were less depressed than subjects with less education ($p < .01$). The income group of more than \$ 70,000 per year are more depressed than the other income groups ($p < .05$), and the category of divorced and widowed are more depressed than married and cohabiting ($p < .05$). All the above relationships are statistically significant.

Current depression predicted by marijuana abuse (Table 3)

The results of the regression analysis for marijuana abuse are shown in table 3. The same steps as for marijuana use are followed, and the same variables are included except the independent variables here are current marijuana abuse and previous

marijuana abuse. The dependent variable is the same, current depression, but this time predicted by marijuana abuse. A hierarchy of regression analysis was conducted again including step by step control variables following the above shown models. The findings for marijuana abuse are very similar to those for marijuana use. The first step shows that marijuana abusers are more depressed than non-abusers, where current abuse has a stronger effect ($p < .001$) on current depression. When included in the regression, previous depression (lifetime) is again the strongest predictor of current depression. The same pattern of a reversed effect of previous marijuana abuse is observed where previous marijuana abusers are currently less depressed, but in this case the relationship is not statistically significant. When we include any other lifetime mental disorder we see that subject who suffer from other mental disorders are more depressed than the ones who do not ($p < .001$). Unemployment also has a negative effect on current depression ($p < .01$). Women are more depressed than men and the relation is statistically significant ($p < .05$). Also, the divorced and widowed category is more depressed than the other categories ($p < .05$). This analysis show that even when we use marijuana abuse as the independent variable, previous depression (lifetime) still remains the strongest predictor of current depression throughout the analysis.

Current depression past predicted by marijuana dependence (Table 4)

In this phase of analysis (findings are shown on table 4), the independent variables are current marijuana dependence and previous marijuana dependence. The same hierarchy of regression analyzes are conducted as for marijuana use and abuse. The

patterns remain the same. People who are dependent on marijuana are more depressed than those who are not, and subjects currently dependent on marijuana are more depressed than those who are previously dependent ($p < .001$). When included in the analysis previous depression (lifetime) again explains most of current depression and the result is statistically significant. Any other lifetime mental disorder is also significantly associated with current increased depression ($p < .001$). The patterns remain very similar to the other control variables age, gender, income, employment, marital status, and education as for marijuana abuse.

The second hypothesis: Current marijuana use predicted by depression (Table 5)

Model 1: Previous and current depression

In this step of the analysis, the relationship between current marijuana use (dependent variable) and previous and current depression (independent variables), is examined. The results show that current depression is associated with increased marijuana use past year ($p < .001$), and previous depression is associated with increased current marijuana use but the result is not statistically significant.

Model 2: Previous marijuana use (lifetime)

From this analysis, we see that previous marijuana use (lifetime) is the main predictor of current marijuana use and the result is statistically significant ($p < .001$). The effect of current depression is less but still significant ($p < .05$), and previous depression,

in this case, is associated with less current marijuana use, but the result is not statistically significant.

Model 3: Other mental and drug disorders

In the third step of the analysis, three control variables, any other lifetime drug use (excluding marijuana), any other lifetime drug abuse or dependence (excluding marijuana), and any other lifetime mental disorder (excluding depression), are included. Previous marijuana use (lifetime) remains significantly ($p < .001$) the main predictor, but this time with a lesser effect. In this step of the analysis, we see that any other lifetime drug use is associated with increased current marijuana use and the association is statistically significant ($p < .001$). With regard to any other lifetime drug abuse and dependence, we see that they are associated with increased current marijuana use and this association is also statistically significant. Any other lifetime mental disorder is associated with increased current marijuana use, but the result is not statistically significant.

Model 4: Age, Education, Employment, Income, Marital status, and Gender

In another analysis six control variables are included: gender, age, education, income, employment status, and marital status. Previous marijuana use (lifetime) has the main effect on current marijuana use. Findings show that students use more marijuana than any other category. Two other categories that tend to use more marijuana are unemployed, never married, and the widowed and divorced categories. The female category is negatively associated with current marijuana use ($p < .001$).

Model 5: Other mental and drug disorders + Age, Education, Employment, Income, Marital status, and Gender

The final step of the analysis in the first model examines the relationship between current marijuana use as the dependent variable, including previous and current depression as independent variables, including all above mentioned control variables in one analysis. In this step, we find the same pattern where previous marijuana use (lifetime) remains the strongest predictor ($p < .001$) of current marijuana use. Also, any other lifetime drug use is strongly associated with increased past year marijuana use ($p < .001$). Any other lifetime drug abuse and dependence is associated with increased current marijuana use ($p < .001$). Also, the never married category, the widowed and divorced, have a statistically significant association with increased current marijuana use ($p < .001$).

Current marijuana abuse predicted by depression (Table 6)

The regression analyses for marijuana abuse are very similar to those for marijuana use. The first analysis has current marijuana abuse as dependent variable, while the two independent variables are previous and current depression. A hierarchy of regression analysis was conducted again including step by step control variables following the above shown model. The findings for the first step show that those who are currently depressed are more likely to abuse marijuana while those previously depressed are less likely to abuse marijuana than the non-depressed subjects. Previous marijuana abuse (lifetime) is still the strongest predictor of current marijuana abuse when included

in the analysis. Users of other drugs are also more likely to currently abuse marijuana. Students and the unemployed tend to abuse marijuana more than the other categories. Again, males abuse marijuana more than females do and the result is statistically significant at ($p < .001$).

Current marijuana dependence predicted by depression (Table 7)

In this phase of analysis, the dependent variable is current marijuana dependence. The same hierarchy of regression analyses are conducted as for marijuana use and abuse. The currently depressed are more dependent on marijuana ($p < .001$). Subjects that are previously dependent on marijuana tend to be dependent currently. When introduced to the regression analysis, any other lifetime drug use, any other lifetime mental disorder, and other lifetime drug abuse and dependence, we find that any other drug use has a very strong effect, and it is associated with increased current marijuana dependence ($p < .001$). Also, any other drug abuse and dependence has a significant effect and is associated with increased marijuana dependence. The patterns remain similar to the previous analyses for the other control variables age, gender, income, employment, marital status, and education as for marijuana use and abuse. In the final step of the analysis where all the variables are included, we find an interesting pattern. Any other lifetime drug use is the strongest predictor of current marijuana dependence, followed by a small difference with previous marijuana dependence (lifetime). Both of these coefficients are statistically significant ($p < .001$). Any other lifetime drug abuse or dependence is another strong predictor of current marijuana dependence. We see again that the unemployed, never

married, and students, tend to be more dependent on marijuana. Women are again less dependent on marijuana ($p < .001$).

CHAPTER FIVE

DISCUSSION AND CONCLUSION

As mentioned earlier, the purpose of this study is to find the temporal order in the relationship between marijuana use, abuse, and dependence and depression. As the above findings show, the patterns of the occurrence are unclear. In the first hypothesis where current depression was predicted by previous and current marijuana use we saw that current marijuana users are slightly more depressed than non-users.

When controlled for previous depression, previous marijuana use showed to be associated with decreased current depression, and this association is statistically significant (.05 two-tailed). Previous depression is the strongest predictor of current depression, and the relationship is statistically significant (.001). Another variable that is associated with current depression is any other lifetime mental disorders. This reinforces the pattern of comorbidity of mental disorders. In this case, past year depression is associated with other mental disorders, and this relation is significant at .001.

Controlling for the age variable showed that older subjects are less depressed than younger ones, and the relation is significant at the .001 level for the 45-54 year old group. Controlling for the income variable showed that the income group of \$ 70,000 and more per year is more depressed than the other income groups, significant at the .05 level. Marital status is also associated with depression. The category of divorced and widowed is more depressed than the category of married and cohabiting, at significance level of .05. Similar to other studies, women are more depressed than men, and the relation is significant at .05.

Findings are similar when marijuana abuse and dependence are used to predict current depression. Previous marijuana abuse and dependence showed to contribute to decreased depression over the past year but both of the results are not statistically significant. Current marijuana dependence is associated with increased depression past year and the relation is significant at the .05 level (one-tailed).

In both analyses for marijuana abuse and dependence, previous depression is the strongest predictor of current depression and in both cases is significant at .001. Results of the analyses for the other control variables for marijuana abuse and dependence remain similar to marijuana use.

In the second hypothesis, previous and current depression, are used to predict current marijuana use, abuse, and dependence. But analyses still do not reveal a clear pattern. When depression is used to predict current marijuana use we find that those who were previously depressed tend to use less marijuana past year, while the subjects that are currently depressed tend to use more marijuana during the past year, but all these relations are not statistically significant when other variables are included in the analysis. Previous marijuana use, when included in the analysis, has the main effect on past year marijuana use, significant at .001. Also, any lifetime other drug use is strongly associated with past year marijuana use ($p < .001$). Other drug abusers and dependents tend to use more marijuana currently ($p < .001$). This again reinforces that marijuana users tend to use other drugs also. When the age variable is included, it is seen that older subjects use less marijuana, and the relationship is significant at .001. The more educated use less marijuana, but this result is not statistically significant. There is not a statistically significant relation between the employment and income variables and current marijuana

use. With regard to marital status, the categories of never married use more marijuana ($p < .001$) followed by the divorced and widowed ($p < .05$) as compared to the married and cohabiting category. Women are much less likely than men to use marijuana, and the result is significant at .001. In the analysis for marijuana abuse, previous marijuana abuse is the strongest and the most significant predictor of current marijuana abuse, while any lifetime other drug use is associated with past year marijuana abuse, but the result is not statistically significant. Also, current depression is associated with current marijuana use but the result is not statistically significant. In the regression analysis for current marijuana dependence predicted by depression, other drug use when included in the regression, is the main predictor of current marijuana dependence ($p < .001$) and previous marijuana dependence has a strong effect on past year dependence ($p < .001$). Other drug abuse and dependence also explain part of these relationship ($p < .001$). It seems that other drug use, abuse, and dependence and previous marijuana dependence explain current marijuana dependence, while the effect of previous depression is weak and not statistically significant.

An important finding of this study is that current marijuana users are more depressed than non-users. While previous marijuana use is associated with current decreased depression past year, which might be as result of failure to recall earlier problems. Another conclusion which could be drawn is that, at the time of use marijuana has a negative effect on depression, but the lag of this effect is short. When controlled for previous depression, we see that it is the best predictor of current depression. In the second hypothesis, it is previous marijuana use and other drug use, abuse, and dependence that explain past year marijuana use and abuse, while past year depression

has almost no effect on current marijuana use when controlled for previous marijuana use. Other drug use is the best predictor of current marijuana dependence along with previous marijuana dependence. This result confirms the pattern of comorbidity, in this case, marijuana users tend to use other drugs that can contribute to a higher level of depression. It seems that the findings of this study support the findings of Green and Ritter (2000).

Despite the attempt to find if it is marijuana use that precedes depression or if it is depression that precedes marijuana use, the pattern seems to be unclear. The two disorders are correlated and effect each other over time, but this study could not establish a temporal order. Findings show that marijuana users are slightly more depressed at the time of use, but the effect does not carry over time. In this study, it was not found a strong argument to support the coping theory. In the study by Green and Ritter (2000) coping is measured by only one question, where subjects were asked if they used marijuana to cope. While in this study the conclusion for coping is derived from the analysis in the second hypothesis where depression is used to predict marijuana use. Results show that previous depression does not contribute to current marijuana use. It seemed that there was a weak association between past year depression and past year marijuana abuse and dependence, but this effect is insignificant when controlled for previous marijuana and other drug use, abuse and dependence. The unclear pattern of the temporal order in the relationship between marijuana use and depression can be explained by previous problem behavior clustering.

This study also shows that marijuana users also tend to use other drugs, that can partially explain why users are more depressed. Also, this study observes a clear pattern of comorbidity between depression and other mental disorders.

There are a number of limitations in this study. The data used for the analyses are secondary data from the National Comorbidity Survey. The NCS is a cross-sectional survey that is based on reports of the past in order to assess the prevalence of lifetime disorders. It is important to recognize that NCS being a cross sectional survey has problems of recall failure that partially exist. It is possible that people that were depressed in the past and are in present good mental health do not recall it. Also, the NCS survey was conducted by non-clinicians, which reduces the precision of the diagnoses. With regard to the pattern that previous marijuana use is associated with current decreased depression this study could not establish a certain explanation. Still, marijuana use in early ages could have some negative effects on depression. Future research might investigate these matters more deeply and provide a clearer explanation of these patterns.

REFERENCES

Borges Guilherme, Walters Ellen E, Kessler Ronald C. 2000. "Association of substance use, abuse, and dependence with subsequent suicidal behavior". *American Journal of Epidemiology*. 151: 781-789.

Brook Judith S, Kessler Ronald C, Cohen Patricia. 1999. "The onset of marijuana use from preadolescence and early adolescence to young adulthood". *Development and psychopathology*. 901-914.

Dembo Richard, Williams Linda, Wothke Werner, Schmeidler James. 1992. "Examining a structural model of the relationships among alcohol use, marijuana/hashish use, their effects, and emotional and psychological problems over time in a cohort of high-risk youths". *Deviant behavior: An interdisciplinary journal*. 13: 185-215.

Galaif Elisha R, Chou Chih-Ping, Sussman Steve, Dent Clyde W. 1998. "Depression, suicidal ideation, and substance use among continuation high school students". *Journal of youth and adolescence*. 27: 275-295.

Gove Walter G, Geerken Michael, Hughes Michael. 1979. "Drug use and mental health among a representative national sample of young adults". *Social forces*. 58: 572-590.

Green Brian E, Ritter Christian. March 2000. "Marijuana use and Depression". *Journal of Health and Social Behavior*. 41: 40-49

Hansell Stephen, White Helen Raskin. 1991. "Adolescent drug use, psychological distress, and physical symptoms". *Journal of health and social behavior*. 32: 288-301.

Johnson Robert J, Kaplan Howard B. 1990. "Stability of psychological symptoms: Drug use consequences and intervening processes". *Journal of health and social behavior*. 31: 277-291.

Jones Suzanne P, Heaven Patrick C.L. 1998. "Psychosocial correlates of adolescent drug-taking behavior". *The association for professionals in services for adolescents*. 127-134.

Kessler R.C, Nelson C. B, McGonagle K.A, Liu J, Swartz M, Blazer D.G. 1996. "Comorbidity of DSM-III-R major depressive disorder in the general population: Results from the US National Comorbidity Survey". *British Journal of psychiatry*. 168 suppl. 30, 17-30.

Kessler Ronald C, Borges Guilherme, Walters Ellen E. 1999. "Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey". *Archives of General Psychiatry*. 56: 617-626

Kessler Ronald C, Crum Rosa M, Warner Lynn A, Nelson Christopher B, Schulenberg John, Anthony James C. April 1997. "Lifetime Co-occurrence of DSM-III-R Alcohol abuse and dependence with other psychiatric disorders in the National Comorbidity Survey". *Archives of General Psychiatry*. 54: 313-321

Kessler Ronald C, Nelson Christopher B, McGonagle Katherine A, Edlund Mark J, Frank Richard G, Leaf Philip J. January 1996. "The epidemiology of co-occurring addictive and mental disorders: Implications for prevention and service utilization". *American Journal of Orthopsychiatry* 66: 17-31.

Merikangas Kathleen R, Mehta Rajni L, Molnar Beth E, Walters Ellen E, Swendsen Joel D, Aguilar-Gaziola Sergio, Bijl Rob, Borges Guilherme, Caraveo-Anduaga Jorge J, Dewit David J, Kolody Bohdan, Vega William A, Wittchen Hans-Ulrich, Kessler Ronald C. 1998. "Comorbidity of substance use disorders with mood and anxiety disorders: results of the international consortium in psychiatric epidemiology". *Addictive behaviors*. 23: 893-907.

Newcomb Michael D, Bentler Peter M. 1988. "Consequences of adolescent drug use". *Sage publications*.

Stein Judith A, Newcomb Michael D, Bentler P.M. 1987. "An 8-year study of multiple influences on Drug use and Drug use consequences". *Journal of personality and social psychology*. 53: 1094-1105.

Swendsen Joel D, Merikangas Kathleen R, Canino Glorisa J, Kessler Ronald C, Rubio-Stipec Maritza, Angst Jules. 1998. "The comorbidity of alcoholism with anxiety and depressive disorders in four geographic communities". *Comprehensive psychiatry*. 39: 176-184.

The American Psychiatric Association. 1987. "Diagnostic and Statistical Manual of Mental Disorders Third Edition Revised (DSM-III-R). *American Psychiatric Association*. 167-169.

Warner Lynn A, Kessler Ronald C, Hughes Michael, James Anthony C, Nelson Christopher B. 1995. "Prevalence and correlates of drug use and dependence in The United States". *Archives of general psychiatry*. 52: 219-229

Wittchen Hans-Ulrich. 1994. "Reliability and validity of the who-composite International Diagnostic Interview (CIDI): A critical review". Journal of psychiatry. 28: 57-84

(<http://www.Samhsa.gov>).

(<http://www.health.org/govstudy/htm>).

(<http://www.nimh.nih.gov/publicat/stats.cfm>).

APPENDIX A. Description of Variables

1. 12 month major depression w/o hierarchy: 12 month major depression without hierarchy 0=Absent, 1=Present.

2. Marijuana use in the past 12 months: Met DSM-III-R criteria for marijuana use for the 12 months prior to the interview=1

Did not meet DSM-III-R criteria for marijuana use for the 12 months prior to the interview=0

3. Marijuana abuse in the past 12 months: Met DSM-III-R criteria for marijuana abuse for the 12 months prior to the interview=1

Did not meet DSM-III-R criteria for marijuana abuse for the 12 months prior to the interview=0

4. Marijuana dependence in the past 12 months: Met DSM-III-R criteria for marijuana dependence for the 12 months prior to the interview=1

Did not meet DSM-III-R criteria for marijuana dependence for the 12 months prior to the interview=0

DEMOGRAPHIC VARIABLES. (An asterisk indicates the comparison category).

1. AGE

- Ages 15-24*

- Ages 25-34
- Ages 35-44
- Ages 45-54

2. EDUCATION

- 0-11 years of education*
- 12 years of education
- 13-15 years of education
- 16+ years of education

3. EMPLOYMENT

- Employment homemaker
- Employment, other
- Employment, student
- Employment, worker*

4. INCOME

- Income \$0-19,999*
- Income \$20,000-\$34,999
- Income \$35,000-\$69,999
- Income \$70,000+

5. MARITAL STATUS

- Marital status category 1: married or cohabiting*
- Marital status category 2: separated, widowed, divorced
- Marital status category 3: never married

6. GENDER

- Male*
- Female

7. Any other drug use excluding marijuana includes: Lifetime use of alcohol, sedatives, tranquilizers, stimulants, analgesics, inhalants, cocaine, hallucinogens, and heroin.

8. Any other drug abuse and dependence excluding marijuana includes: Lifetime abuse and dependence on alcohol, sedatives, tranquilizers, stimulants, analgesics, inhalants, cocaine, hallucinogens, and heroin.

9. Any other mental disorder excluding major depression w/o hierarchy includes:
Lifetime general anxiety disorder, mania, phobia, agoraphobia, antisocial behavior, conduct disorder, post traumatic stress disorder, and psychosis.

APPENDIX A: Tables 2-7

Table 2: Models for marijuana use predicting depression.

Variable name	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Previous marijuana use	1.33*	0.68*	0.60**	0.71*	0.65*
Current marijuana use	2.09***	1.47*	1.19	1.22	1.04
Previous depression (lifetime)		55.62***	41.86***	67.03***	51.12***
Any drug use lifetime			1.11		1.02
Any mental disorder lifetime			2.35***		2.32***
Any drug abuse or dependence lifetime			1.06		1.07
Age					
Age group from 25 to 34 years				0.82	0.81
Age group from 35 to 44 years				0.66	0.68
Age group from 45 to 54 years				0.36***	0.35***

Models for marijuana use predicting depression. (Table 2 continues)

	Model 1	Model 2	Model 3	Model 4	Model 5
Education				Odds Ratio	Odds Ratio
12 years of education				0.67**	0.71**
13 to 15 years of education				0.60**	0.65*
More than 16 years of education				0.43***	0.50**
Employment					
Homemaker				1.21	1.23
Other				2.21**	2.17**
Student				1.25	1.26
Income					
Household income range from \$20,000 - \$34,999 per year				1.01	1.03
Household income range from \$35,000 - \$69,999 per year				0.99	1.03
Household income more than \$70,000 per year				1.44	1.61*

Models for marijuana use predicting depression. (Table 2 continues)

	Model 1	Model 2	Model 3	Model 4	Model 5
Marital Status				Odds Ratio	Odds Ratio
Never married				1.31	1.39
Separated, widowed, divorced				1.64*	1.63*
Gender					
Female				1.29*	1.33*
Overall model chi-sq	1041.85	1061.43	1339.90	2024.63	2227.68

*p<.05; **p<.01; ***p<.001

Table 3: Models for marijuana abuse predicting depression.

Variable name	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Previous marijuana abuse	1.82**	0.85	0.71	0.88	0.75
Current marijuana abuse	2.42***	2.18***	1.62	1.67*	1.30
Previous depression (lifetime)		52.43***	39.33***	63.97***	48.94***
Any drug use lifetime			1.05		0.97
Any mental disorder lifetime			2.33***		2.32***
Any drug abuse or dependence lifetime			1.07		1.08
<i>Age</i>					
Age group from 25 to 34 years				0.77	0.76
Age group from 35 to 44 years				0.64*	0.64*
Age group from 45 to 54 years				0.36***	0.35***

Models for marijuana abuse predicting depression (Table 3 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Education				Odds Ratio	Odds Ratio
12 years of education				0.67**	0.70**
13 to 15 years of education				0.58**	0.62**
More than 16 years of education				0.43***	0.50***
Employment					
Homemaker				1.20	1.22
Other				2.20**	2.15**
Student				1.27	1.28
Income					
Household income range from \$20,000 - \$34,999 per year				1.01	1.03
Household income range from \$35,000 - \$69,999 per year				1.00	1.03
Household income more than \$70,000 per year				1.46	1.63*

Models for marijuana abuse predicting depression (Table 3 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Marital status				Odds Ratio	Odds Ratio
Never married				1.37	1.45
Separated, widowed, divorced				1.61*	1.58*
Gender					
Female				1.32*	1.36*
Overall model chi-sq	1007.23	1126.07	1363.36	1779.91	1760.52

*p<.05; **p<.01; ***p<.001

Table 4: Models for marijuana dependence predicting depression.

Variable name	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Previous marijuana dependence	1.81***	0.87	0.76	0.90	0.81
Current marijuana dependence	2.77***	2.86***	2.25**	2.08**	1.71#
Previous depression (lifetime)		52.88***	40.18***	64.07***	49.56***
Any drug use lifetime			1.02		0.95
Any mental disorder lifetime			2.30***		2.29***
Any drug abuse or dependence lifetime			1.03		1.05
Age					
Age group from 25 to 34 years				0.78	0.77
Age group from 35 to 44 years				0.64*	0.65*
Age group from 45 to 54 years				0.37***	0.35***

Models for marijuana dependence predicting depression (Table 4 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Education				Odds Ratio	Odds Ratio
12 years of education				0.68**	0.71**
13 to 15 years of education				0.58**	0.63**
More than 16 years of education				0.44***	0.50***
Employment					
Homemaker				1.19	1.21
Other				2.16**	2.12**
Student				1.28	1.29
Income					
Household income range from \$20,000 - \$34,999 per year				1.02	1.04
Household income range from \$35,000 - \$69,999 per year				1.01	1.04
Household income more than \$70,000 per year				1.47	1.64*

Models for marijuana dependence predicting depression (Table 4 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Marital status				Odds Ratio	Odds Ratio
Never married				1.36	1.43*
Separated, widowed, divorced				1.62*	1.60*
Gender					
Female				1.34*	1.38**
Overall model chi-sq	1076.59	947.62	1227.14	1781.40	1827.21

*p<.05; **p<.01; ***p<.001

significant .05 one-tailed

Table 5: Models for depression predicting marijuana use.

Variable name	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Previous depression	1.09	0.69	0.52**	1.01	0.71
Current depression	1.86***	1.52*	1.13	1.41*	1.01
Previous marijuana use (lifetime)		54.69***	21.47***	86.00***	38.90***
Any drug use lifetime			4.26***		4.84***
Any mental disorder lifetime			1.16		1.10
Any drug abuse or dependence lifetime			1.85***		1.62***
Age					
Age group from 25 to 34 years				0.49***	0.44***
Age group from 35 to 44 years				0.37***	0.37***
Age group from 45 to 54 years				0.17***	0.21***

Models for depression predicting marijuana use (Table 5 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
				Odds Ratio	Odds Ratio
Education					
12 years of education				0.94	0.93
13 to 15 years of education				0.72	0.71
More than 16 years of education				0.72	0.70
Employment					
Homemaker				0.75	0.76
Other				1.30	1.24
Student				1.31	1.47
Income					
Household income range from \$20,000 - \$34,999 per year				0.78	0.83
Household income range from \$35,000 - \$69,999 per year				0.81	0.81
Household income more than \$70,000 per year				0.82	0.90

Models for depression predicting marijuana use (Table 5 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Marital status				Odds Ratio	Odds Ratio
Never married				2.26***	2.50***
Separated, widowed, divorced				1.42*	1.54*
Gender					
Female				0.52***	0.60***
Overall model chi-sq	1464.11	1033.42	821.93	2963.24	4351.44

*p<.05; **p<.01; ***p<.001

Table 6: Models for depression predicting marijuana abuse.

Variable name	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Previous depression	0.80	0.32*	0.29**	0.57	0.51
Current depression	2.27***	1.21	1.04	1.73*	1.55
Previous marijuana abuse (lifetime)		***	***	***	***
Any drug use lifetime			1.94		2.18
Any mental disorder lifetime			1.43		1.25
Any drug abuse or dependence lifetime			1.23		1.00
Age					
Age group from 25 to 34 years				0.51*	0.48*
Age group from 35 to 44 years				0.26***	0.25***
Age group from 45 to 54 years				0.22**	0.23**

Models for depression predicting marijuana abuse (Table 6 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
				Odds Ratio	Odds Ratio
Education					
12 years of education				0.76	0.81
13 to 15 years of education				0.88	0.98
More than 16 years of education				0.68	0.79
Employment					
Homemaker				1.88	1.76
Other				2.19	2.36
Student				2.16	2.19
Income					
Household income range from \$20,000 - \$34,999 per year				1.26	1.35
Household income range from \$35,000 - \$69,999 per year				1.25	1.33
Household income more than \$70,000 per year				1.42	1.46

Models for depression predicting marijuana abuse (Table 6 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Marital status				Odds Ratio	Odds Ratio
Never married				1.65	1.63
Separated, widowed, divorced				1.09	1.05
Gender					
Female				0.30***	0.32***
Overall model chi-sq	1509.62	1056.81	1567.41	9320.53	14384.06

*p<.05; **p<.01; ***p<.001

*** Coefficient unstable, not estimated

Table 7: Models for depression predicting marijuana dependence.

Variable name	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Previous depression	0.87	0.49*	0.32**	0.90	0.59
Current depression	2.57***	2.01*	1.17	2.20**	1.21
Previous marijuana dependence (lifetime)		27.07***	7.09***	21.29***	6.77***
Any drug use lifetime			6.48***		7.10***
Any mental disorder lifetime			1.84**		1.67*
Any drug abuse or dependence lifetime			2.72***		2.58***
Age					
Age group from 25 to 34 years				0.71	0.65
Age group from 35 to 44 years				0.36**	0.37**
Age group from 45 to 54 years				0.05***	0.08***

Models for depression predicting marijuana dependence (Table 7 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Education				Odds Ratio	Odds Ratio
12 years of education				0.57*	0.57*
13 to 15 years of education				0.82	0.72
More than 16 years of education				0.52	0.59
Employment					
Homemaker				1.65	1.63
Other				2.47**	2.35*
Student				1.01	1.62
Income					
Household income range from \$20,000 - \$34,999 per year				0.50*	0.57*
Household income range from \$35,000 - \$69,999 per year				0.59*	0.69
Household income more than \$70,000 per year				1.17	1.25

Models for depression predicting marijuana dependence (Table 7 continues).

	Model 1	Model 2	Model 3	Model 4	Model 5
Marital status				Odds Ratio	Odds Ratio
Never married				1.45	1.69*
Separated, widowed, divorced				1.31	1.26
Gender					
Female				0.30***	0.39***
Overall model chi-sq	1521.92	878.45	696.74	2417.85	4104.96

*p<.05; **p<.01; ***p<.001

CURRICULUM VITAE

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EDUCATION

Master of Science in Sociology February 8, 2002
Virginia Polytechnic Institute and State University, Blacksburg, VA

Diploma in Social Work, June 1993
Tirana State University, Tirana, Albania

Bachelor of Science in Civil Engineering, June 1991
Tirana State University, Tirana, Albania

PROFESSIONAL EXPERIENCE

Research Assistant, January 2002-Present, Department of Geography
Virginia Polytechnic Institute and State University

- Conduct research with a pilot study on Immigration and Health in the U.S.

Interpreter, Interpreter Services of Refugee & Immigration Services,
Roanoke, VA, January 2002-Present (on an as-needed basis)

English Tutor ESL (volunteer), Refugee & Immigration Services,
Roanoke, VA, December 2001- Present

Graduate Research and Teaching Assistant, August 2000 – May 2001
Department of Sociology, Virginia Tech, Blacksburg, VA

- Performed statistical and data analysis using SPSS and SUDAAN.
- Participated in a research on consumerism in different economies and cultures.

Project Management and Implementation Assistant

January 1995 – August 1997,

Project Management Unit of the Irrigation Rehabilitation Project,
Financed and Administrated by the World Bank, Tirana, Albania

- Participated in a research study, conducted in the rural areas of Albania covered by the project, in order to provide funding to small business farmers.

WORKSHOPS ATTENDED

“Water Savings: Prospects and Challenges”, organized by
the “International Center for Advanced Agronomic Studies, Bari, Italy”
October – November 1995, Cairo, Egypt.

“Concrete for Engineers”, organized by “British Cement Association”
April – May 1996, London, England

“Irrigation Water Management Study Tour of the U.S. Western States”, organized by “International Irrigation Center”, Utah State
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LANGUAGES

English Fluent
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