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The Relationship Between Tobacco, Alcohol, and Marijuana Use  
Among Teenagers

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A thesis  
presented to  
the faculty of the Department of Criminal Justice  
East Tennessee State University

In partial fulfillment  
of the requirements for the degree  
Master of Arts in Criminal Justice and Criminology

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by  
John D. Rose  
May 2006

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Dr. Larry Miller, Chair  
Dr. Michael Braswell  
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Keywords: Teenagers, Marijuana, Alcohol, Tobacco

## ABSTRACT

### The Relationship Between Tobacco, Alcohol, and Marijuana Use Among Teenagers

by

John D. Rose

The purpose of this study was to explore the relationship between alcohol, tobacco, and marijuana use among teenagers. This study examined three research questions: (1) Is there a relationship between demographic characteristics (i.e., sex and race), the attitudinal variable (attachment to family), and the admitted use of marijuana, alcohol, and tobacco among teenagers? (2) Is there a relationship between the use of marijuana by teenagers and the use of tobacco by teenagers? (3) Is there a relationship between the use of marijuana by teenagers and the use of alcohol by teenagers?

The data used for this paper were from the Evaluation of the Gang Resistance Education and Training Program research project (Esbensen, 2003). The analysis found that the frequency of teenage alcohol use had the strongest correlation with the use of marijuana. The frequency of teenage tobacco use was also found to have a significant correlation to marijuana use.

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## DEDICATION

This work is dedicated to my wife, Betsy, and children, Joshua and Kristen; they sacrificed more than I during its writing.

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## CHAPTER 1

### INTRODUCTION

The problem of addiction and the associated costs to American society have been studied for years. The problem is never seen in a more troubling light than when it involves young people. As with any problem that we seek to address, we must first attempt to understand the behavior that we seek to change. By understanding the correlations between the use and addiction of alcohol, tobacco, and marijuana among young people, we may take the first step in understanding the common behaviors and activities that lead to this substance use.

According to the National Institute on Drug Abuse (NIDA), marijuana is the most widely used illegal drug among Americans age 12 and older (National Institute on Drug Abuse, 2003a). In a 2001 survey, an estimated 12 million people admitted using marijuana within the last month (National Household Survey on Drug Abuse, 2003b). The same government agency reported that a 2002 survey revealed that 71.5 million people used tobacco at least once in the last month before the survey (NIDA, 2003a). An estimated 3 million young people between 12 and 20 years of age were dependent on or abused alcohol (NHSDA, 2003a). These statistics clearly showed that the use of these destructive substances is widespread in our nation.

In a 2002 survey of 68,126 persons age 12 and older, 26% were smokers and 63% of those were daily smokers, and the rate for ages 12 to 17 years was 13% smokers (National Household Survey on Drug Use and Health, 2003). When looking at the frequency of smoking as surveyed among daily smokers by the subgroup, a higher percentage of females smoked on a daily basis than males, and whites smoked more than other races in the study (NHSDUH).

In a 2001 survey of 32,000 persons between the ages of 12 and 20 years, 28.5% reported using alcohol at least once in the last month. Also, nearly 7% of these using alcohol reported having five or more drinks on one occasion (the threshold considered to be binge drinking). Although the rate of alcohol use by males (29.8%) was higher than females, females were a close

second at 27.2%. Non-Hispanic whites had the highest rate of alcohol use among the races examined, Hispanics, Blacks, Asians, and Whites (NHSDA, 2003a).

### Purpose of the Current Study

The focus of this paper was to explore the relationships between alcohol, tobacco, and marijuana among teenagers. This study examined three research questions: (1) Is there a relationship between demographic characteristics (i.e., sex, race) and the attitudinal variable *attachment to family* (feel lonely with family) and the admitted use of marijuana, alcohol, and tobacco among teenagers? (2) Is there a relationship between the use of marijuana by teenagers and the use of tobacco by teenagers? (3) Is there a relationship between the use of marijuana by teenagers and the use of alcohol by teenagers?

The study tested for the correlation between alcohol and tobacco use and the admitted use of marijuana by teenagers surveyed. The data used for this paper were from a cross-sectional survey taken from the Evaluation of the Gang Resistance Education and Training Program in the United States research project (Esbensen, 2003). The data examined were taken from Part 1, Student Data, and Cross-sectional Design questionnaire. There were 5,935 cases of 8<sup>th</sup>-grade students enrolled in the G.R.E.A.T. program who completed the questionnaire, from 11 selected cities, with 264 variables.

The variables chosen for this study were the nominal, dichotomous variable *Ever Used Marijuana? (Yes/No)* and the variables *Times Used Tobacco, Times Used Alcohol, Feel Lonely with Family, Gender, and Race*.

### Hypotheses

H1: Male teenagers are more likely to engage in the use of marijuana, alcohol, and tobacco use than female teenagers.

H2: White teenagers are more likely to engage in the use of marijuana, alcohol, and tobacco use than non-white teenagers.

H3: Teenagers who feel lonely with their family are more likely to engage in the use of marijuana, alcohol, and tobacco.

H4: Teenagers who use alcohol are more likely to use marijuana than those teenagers who do not drink alcohol.

H5: Teenagers who use tobacco are more likely to use marijuana than those teenagers who do not use tobacco.

### Limitations

The data used from the G.R.E.A.T. study have several limitations because of how and when they were gathered. The survey was conducted in 1995 and was cross sectional in design and, therefore, did not lend itself to indications of causation. The G.R.E.A.T. survey sample was not randomly chosen; however, the sample was quite large. The survey also used self-reporting by teenagers, of activity some of which they may have a motive to either conceal or exaggerate. The data are now over 20 years old and substance abuse trends may have changed among teenagers.

## CHAPTER 2

### LITERATURE REVIEW

Much of the previous work studying the relationships between tobacco, alcohol, and marijuana was an effort to show a causal effect or a gateway function of alcohol and tobacco to marijuana. Although this research project is limited to a correlational study of these variables from a cross-sectional data set, the previous research is a valuable tool to examine this question.

It is important to review the prior research on the juvenile use of tobacco, alcohol, and marijuana. The National Survey on Drug Use and Health (NSDUH), formerly known as the National Household Survey on Drug Abuse, that has been published by the office of Applied Studies, Substance Abuse, and Mental Health Services Administration (SAMHSA), provides much of the data on the use and abuse of alcohol, tobacco, and marijuana as well as other national and international surveys of substance abuse.

It is important to recognize the need to continue to monitor the future research on the use and abuse of alcohol, tobacco, and marijuana by adolescents. The review of the research indicates the need for long-term longitudinal studies across diverse demographic groups of adolescents.

#### Marijuana, Tobacco, and Alcohol

In the year 2000, a survey of 70,000 people 12 years and older measured the use of marijuana (NHSDA, 2003b). From the survey it was estimated that, in the year 2000, 2.4 million people used marijuana for the first time. This was up from an estimated 1.5 million first-time users of marijuana in 1991. Of first-time marijuana users, 51% were males and more than 25% of these were age 14 or younger (NHSDA, 2003b).

In this same study it was found that 60% of first-time marijuana users had used both alcohol and cigarettes prior to trying marijuana. Seventeen percent of first-time marijuana users

had used marijuana but not cigarettes. Fifteen percent of first-time marijuana users had used cigarettes but not alcohol prior to marijuana use. Approximately 9% of first-time marijuana users had used neither alcohol nor cigarettes prior to marijuana (NHSDA, 2003b). Another way to look at this fact is that 91% of first-time marijuana users in the study had first used alcohol and/or cigarettes. Another interesting find in this study was a peak at first-time male users during June and July and for females in January and July (NHSDA, 2003b). This peak in June and July for first-time marijuana users may be related to the academic calendar and the presumed lack of supervision during student summer vacation; however, the study did not address that issue.

In a 2003 CASA report, *Report on Teen Cigarette Smoking and Marijuana Use*, it is reported that teens who smoke are 14 times more likely to try marijuana than teens who report not smoking (National Center on Addiction and Substance Abuse, 2003).

In a December 28, 2001, NHSDA report, *Illicit Drug Use Among Youths Who Used Cigarettes and Alcohol*, the correlations between illicit drug use, including marijuana, alcohol, and cigarettes was studied. It was found that 52% of people between 12 and 17 years of age who smoked cigarettes daily were users of illicit drugs in the last month. It was also discovered that 66% of heavy drinkers in this same age group were users of illicit drugs in the last month. Young people who used both alcohol and cigarettes in the last month were twice as likely to have also used illicit drugs as young people who had only used alcohol or cigarettes but not both. The strongest correlation shown was that young people who used only cigarettes or only alcohol were more than seven times more likely to use illicit drugs in the last month than youths who had used neither alcohol nor cigarettes (NHSDA, 2001).

In the September 22, 2003, issue of *Alcoholism and Drug Abuse Weekly*, a review of a report from the National Center on Addiction and Substance Abuse (CASA) is examined, *Reducing Teen Smoking Reduces Marijuana Use*. A national survey of 1,987 teens ages 12 to 17 and 504 parents was conducted between April 30 and July 14, 2003. Among many questions

asked were items concerning marijuana, cigarettes, and alcohol use. The teens self reported that 385 had tried marijuana at least once (“Reducing Teen Smoking,” 2003).

It was also found that 57% of those teens who had tried marijuana had first tried cigarettes. The teens also reported that they saw a “connection” between cigarette smoking and marijuana smoking (“Reducing Teen Smoking,” 2003). This same survey found that teenagers who smoked cigarettes were 14 times more likely to try marijuana than those who had never smoked. An interesting discovery in this study was that 76% of those teens who were current smokers reported the ability to buy marijuana in less than an hour. Of those teens who have tried cigarettes but are not current smokers, 36% reported being able to purchase marijuana in less than an hour, and of those teens who never smoked only 13% reported the ability to buy marijuana in less than an hour (Lindsay & Rainey, 1997). The report also cites that in schools that tolerate smoking 36% are drug free; and, in schools where smoking is not tolerated, 73% are drug free (Lindsay & Rainey).

In a 1992 research report published in the British Journal of Addiction, researchers looked at the stages of addiction of teenagers. The survey included 1,093 juveniles between the ages of 13 and 17 in Perth, Australia (Blaze-Temple & Kai Lo, 1992). The researchers used the variables *alcohol, tobacco, marijuana, and other drugs*.

In a comparison of the variables currently used, *alcohol, tobacco, and marijuana*, to the dependent variables, *ever used alcohol, tobacco, and marijuana*, the following was reported. For those respondents who reported currently using alcohol, 84% reported having ever used tobacco and 50% having ever used marijuana. For those respondents who reported currently using tobacco, 97% reported having ever used alcohol and 70% having ever used marijuana. For those respondents who reported currently using marijuana, 98% reported having ever used alcohol and 90% having ever used tobacco (Blaze-Temple & Kai Lo, 1992). The significance of this finding to this thesis is that those currently using tobacco had a much higher rate for having ever used marijuana than the other variables of alcohol and tobacco.

The same report cited that while over 70% of current tobacco users had ever used marijuana only 50% of past tobacco users had ever used marijuana and only 15% of non tobacco users had ever used marijuana (Blaze-Temple & Kai Lo, 1992). The link between tobacco and marijuana use is significant throughout the study.

In a Bogota, Colombia study 1,730 10<sup>th</sup>-grade public school students were given a modified version of the Youth Risk Behavior survey to assess their use of alcohol, tobacco, and marijuana. According to the authors, the study revealed a high rate of “gateway” substance use such as alcohol and tobacco. The study also claims a lower rate of marijuana use among the Colombian student sample than that of other similar such samples in the United States. In the survey, 87% of the respondents reported having used alcohol at least once in their lifetime. Of those reporting the use of alcohol, 54% reported that their initial use was before the age of 12. In the same study, 77% reported that they had used tobacco at least one time and, of those, 33% reported initiation between the ages of 9 and 14. As for self-reported marijuana use, only 11% reported having used marijuana at least one time. Of those reporting at least one time using marijuana, 31% initiated experimentation between the ages of 15 and 16 years old (Perez & Pinzon-Perez, 2000).

In a 2005 study of 271 adolescents across North Carolina, the risk factors for abuse and the protective factors against the abuse of alcohol, cigarettes, and marijuana were examined. There was positive correlation found between the frequency of use of marijuana and the frequency of use of cigarettes and alcohol (Graves et al., 2005).

Frequency of alcohol consumption was correlated positively with frequency use over the past 30 days ( $r = .53$ ,  $p, .001$ ) and frequency of cigarette use over the past 30 days ( $r = .52$ ,  $p, .001$ ). Additionally, frequency of cigarette use over the past 30 days was correlated positively with frequency of marijuana use over the past 30 days ( $r = .50$ ,  $p, .001$ ). (p. 6)

The study also hypothesized that because of the nicotine in cigarettes, it may explain the frequent use of cigarettes to satisfy the physiological cravings of nicotine. The study went on to conclude that this frequent use of cigarettes, and its close correlation to marijuana, may explain cigarettes' reported "gateway" effect.

In regard to protective factors, "parental control" had the greatest influence on decreasing the use of marijuana and tobacco. The control was not necessarily related to "warm communication" between parent and child but, rather, control over the child by the parent (Graves et al., 2005a).

In a 1995 study, 7,722 students age 15 and 16 years old from 70 United Kingdom secondary schools were surveyed in an exam setting on a 406-item survey to include questions on the use of alcohol, tobacco, and marijuana. Out of the 7,722 students, 36% reported having used cigarettes, 43.3% reported having used marijuana, and 94% reported having used alcohol, all in the last year. The researchers found a strong relationship between cigarette smoking and the use of marijuana; only 6.9% of students who responded as nonsmokers had ever tried marijuana. In contrast, 89.2% of the respondents who reported having used 10 cigarettes a day in the last 30 days also reported having tried marijuana (McMiller & Plant, 1996).

In a South Carolina study, 4,800 high school students were surveyed to analyze the association between physical activity and the use of tobacco and marijuana use. The results indicated that, in general, increased physical activity decreases the use of marijuana, smokeless tobacco, and cigarettes by adolescents. The protective factor was greater for white males than females or blacks. The authors indicate that there needs to be further study to determine the reason for this difference among gender and race. The authors also hypothesize that the increased physical activity may result in greater self-confidence, improved self-image, and positive use of time after school when adolescents are at greater risk for all risk-taking behavior, all leading to a collective type of protective model. Due to the limitations of this study, no conclusions on these factors were made (Winnail, Valois, McKeown, Saunders, & Pate, 1995).

In 2004 Zhao and Harris looked at an aggregate cross-sectional data set from the Australian National Drug Strategy Household Survey from 1985 to 2001. The study had over 40,000 respondents age 14 years and older (NDHSA, 2001). The purpose of the study was to look for economic relationships to tobacco, alcohol, and marijuana use among the youth of Australia. The researchers wanted to look for ways to predict substance abuse due to economic factors and thus adjust public policy to reduce the abuse of each substance. The reported cost to Australia's economy for the illicit use of alcohol, tobacco, and marijuana was \$43 billion in 1999 (Zhao & Harris, 2004).

The data from Australia indicated that the probability of the general population using marijuana was 14% while the percentage of tobacco users who used marijuana was 34% (Zhao & Harris, 2004). The report also found that 17% of those using alcohol also used marijuana (Zhao & Harris). This would seem to point to a strong correlation between the use of tobacco and marijuana.

This study also found that the estimated correlation coefficients between alcohol, tobacco, and marijuana were all positive and extremely high (Zhao & Harris, 2004). The authors also made the conclusion that "the estimated correlation coefficients across the three drugs in the MVP model are all positive and extremely highly statistically significant, indicating that single-equation estimation loses important cross-equation correlation effects that embody unobserved characteristics" (p. 13). In the end, the authors concluded that there is a strong complementary relationship between marijuana and tobacco (Zhao & Harris).

In a 2004 article, *Psychosocial Correlates of Substance Use Behaviors Among African American Youth*, the use of marijuana, alcohol, and tobacco was studied in relation to other family relationship variables (Wright & Fitzpatrick, 2004). The study looked at 1,494 African American students from grades 5 to 12 in an Alabama school district (Wright & Fitzpatrick). What was interesting about Wright and Fitzpatrick's article in relation to this paper is the choice of variables *marijuana*, *alcohol*, and *cigarettes*.

Wright and Fitzpatrick's (2004) study began with the idea that the relationship between using marijuana, alcohol, and tobacco was a known. The relationship between these substances continues to be found in scholarly journals as substances that are known to be found to have a correlation in use. It should be noted that in Wright and Fitzpatrick's article the best predictor of the use of marijuana, alcohol, and tobacco was the level of parental monitoring (Wright & Fitzpatrick). The use of alcohol, tobacco, and marijuana was not tested for individual correlations.

In an Australian study, *Cannabis, Alcohol, and Cigarettes: Substitutes or Compliments?*, the authors were primarily interested in price responsiveness to the use of substances and the substitutions because of price. The study is still useful for this study because of the correlation found between the substances. The authors hypothesized that alcohol, cigarettes, and marijuana are interrelated because of the similarities between the substances in use and effect. The authors discussed the similar way that cigarettes and marijuana are ingested and the similar euphoric intoxicating effects of alcohol and marijuana (Cameron & Williams, 2001).

The data used for their research were from the Australian National Drug Strategy Household Survey for the years 1988, 1991, 1993, and 1995. The survey sample size was 9,744 and was a cross-sectional survey of non-institutionalized people ages 14 and up (Cameron & Williams, 2001). The results were that 14.3% reported using marijuana in the last year, 81.2% reported using alcohol, and 31.7% are cigarette smokers; 95.8% of marijuana users reported using alcohol, and 63.6% of marijuana users reported being cigarette smokers (Cameron & Williams).

Wagner and Anthony, in 2002, studied the *Exposure Opportunity and other Mechanisms Linking the Use of Alcohol, Tobacco, Marijuana, and Cocaine*. The study focused on the opportunity to use illicit drugs, alcohol, and tobacco and their relationship to one another. The results, however, reveal a strong correlation between the use of tobacco, alcohol, and future marijuana use (Cameron & Williams, 2001).

The data were taken from a household survey of 44,624 persons between the ages of 12 and 25 years. It was determined that once an opportunity for initiation into marijuana use occurred, the likelihood of choosing to use the marijuana was dependent on prior use of alcohol and tobacco. Of those persons who chose to initiate marijuana use, 85% to 95% were or had been alcohol and tobacco users. The estimates for individuals with the same opportunity to try marijuana that were not alcohol or tobacco users were under 25% who chose to use marijuana. It was concluded that users of alcohol and tobacco were seven times more likely than nonusers to use marijuana once an opportunity occurred (Wagner & Anthony, 2002).

The pharmacological factors of tobacco, alcohol, and psychoactive drugs are examined and discussed in Lindsay and Rainey's article, Psychosocial and Pharmacological Explanations of Nicotine's "Gateway Drug" Function. Although the article discussed some of the same theories for the "gateway" function of tobacco and alcohol, the interests for this article are the pharmacological aspects of the connection between the variables of interest, *alcohol*, *tobacco*, and *marijuana*. The authors discuss the drug-induced higher levels of dopamine present with the use of psychoactive drugs such as nicotine, alcohol, cocaine, and other drugs. The researchers also discuss that tobacco use causes the reduction of the enzyme monoamine oxidase B or MAO-B that is the causal factor of the breaking down of dopamine (Lindsay & Rainey, 1997).

The nicotine reduction of MAO-B may cause the enhanced pleasure of using such drugs as alcohol, cocaine, and other psychoactive drugs. The research may provide a clue as to how nicotine may provide a pathway for the next drug to be more pleasurable than it would otherwise have been without the prior and continued use of nicotine (Lindsay & Rainey, 1997).

Even though the research may indicate a gateway effect, Lindsay and Rainey make an important observation about tobacco use by teens, "The primary reason to avoid tobacco use is not because of its gateway function, but because of the tremendous morbidity and mortality it directly causes. Tobacco kills more than 20 times as many Americans each year as all illegal drugs combined" (Lindsay & Rainey, 1997, p. 5).

In the study, Risk Factors for Adolescents Marijuana Use Across Cultures and Across Time, the author used a data set consisting of three unique sets of subjects. The first was a sample of 739, mostly white, teens in the northeast United States. The second was a sample of 1,190 minority teens from the East Harlem section of New York City in the United States. The third group studied was a sample of 1,374 Colombian teens from two different cities in Colombia, South America. The dependent variable studied was marijuana use (Brook, Brook, Arencibia-Mireles, Richter, & Whiteman, 2001).

In the study the authors wanted to see if the risk factors for marijuana use crossed race, cultural, and geographical lines. The authors found that these variables still produced several correlations between the groups and the risk factors for marijuana use by adolescents. One of the groups of variables of interests for this paper is that of the correlations between tobacco, alcohol, and marijuana use.

The authors showed that the adolescent's own "legal" drug use (tobacco and alcohol) increased the chance that the teens would use marijuana. The variable of use of "legal" drugs was one of the strongest predictors of later marijuana use, and this effect was consistent across each of the three samples (Brook et al., 2001). The author's conclusion called the correlations between alcohol, tobacco, and marijuana "robust." The author of the study went on to write, "In addition, decreasing the prevalence of smoking behavior and alcohol use would go a long way to reducing marijuana use among adolescents and young adults" (p. 8).

In a Colorado study, three communities made up a sample of 3,072 individuals ages 12 to 18. Although the authors of this study were examining teen substance abuse from more of a psychiatric and DSM-IV evaluative perspective, there are some interesting points for our study (Young et al., 2002).

In this sample the authors found 46.6% of the respondents having used tobacco, 86.7% having used alcohol, and 50% having used marijuana. These findings are consistent with other

studies cited. The authors spend significant time discussing the increase in all categories for use as the age of the respondents increases (Young et al., 2002).

Although there was a gender gap between the males and the females, with males reporting more use of alcohol, tobacco, and marijuana than females, the difference was not dramatic. As with other studies already cited, the maturation of the sample appears to influence the reported use rate until adulthood (Young et al., 2002).

### Attachment, Risk Taking, and Substance Abuse

Much of the literature on the association of *attachment to family* to substance abuse by adolescents is coupled with the theory of *risk taking* as a correlation or association to substance abuse. The idea that poor parental-child attachment, low self-esteem, risk-taking behavior, and substance abuse are related is found in many studies.

In Gottfredson and Hirschi's (1990) book, *A General Theory of Crime*, the argument is made that the individual's lack of self-control and the inability to delay gratification leads to deviant behavior and crime. The deviant behavior and crime includes the abuse of substances such as alcohol, tobacco, and marijuana. The authors make the case that much of the deviant behavior is associated with "risk-taking behavior" such as getting into fights, sexual promiscuity, associating with a deviant peer group, and of course the use and abuse of substances such as tobacco, alcohol, and marijuana with the associated health risks (Gottfredson & Hirshi).

The hypothesis that substance abuse by teenagers is correlated with the lack of positive parental attachment has been examined by many scholars. In one such study of 350 teenagers, the correlations between "Parental Rejection" and Substance Abuse, Mother's Drinking, Father's Drinking, Self-Esteem, Aggressive, Deviant Peer Group, and Substance Abuse were examined. The strongest correlation was with Parental Rejection; Substance Abuse and Deviant Peer Group with a correlation of .36 (Simons & Robertson, 1989). This study closely linked the lack of positive parental attachment to the youth's involvement with a deviant peer group. The

substance abuse was examined as part of the consequence of the deviant peer group's influence over the youth with poor parental attachment.

In a study of 16,749 adolescents as part of a National Education longitudinal study, the researchers found that parental attachment was linked to self-esteem, and that low self-esteem was linked to risk-taking behavior to include substance abuse (Parker, 2004). In a European study, the researchers surveyed 3,984 students between the ages of 14 and 15 years old. The study found among other conclusions that the students' relationship with their parents provided a barrier to substance abuse. The study also reported that within the parental and child relationship the most robust inhibitor to the child's drug abuse was a strong attachment with their mother (McArdle et al., 2001).

There have been many studies on the general topic of adolescent drug abuse and the connections to substances such as tobacco and alcohol and attachment. The prior research has mainly focused on the "gateway" effect of one substance to another or other variables of suspected causation. The interest of this study is more basic, to find correlations between the use of marijuana, alcohol, and tobacco. To accomplish this goal, a methodology of research was developed as follows.

In a 2002 study of 208 early and middle adolescent males and females, Sensation-Seeking (SS) behavior was measured against self-reports of cigarettes, alcohol, and marijuana. It was found that Sensation Seeking and the related risk-taking behavior was strongly associated with the early onset of substance abuse and continued use in early adulthood. The sensation-seeking and risk-taking behavior had a positive correlation to the early onset of substance abuse. Although the sample was recruited from a psychiatric and pediatric clinic, it would not be unrealistic to consider these findings with the general population. The sample had a mean age of 12.76 years of age and consisted of 81 females and 127 males (Martin et al., 2002, p. 1495).

In a 1997 patient care guide for physicians on recognizing risk factors for substance abuse such as alcohol, marijuana, and cigarettes, the physicians are provided with some

conditions within the family unit as well as the children themselves that are considered warning signs for at-risk adolescents. In this study, the strongest predisposing factor for adolescent drug abuse is the family history of alcohol and drug abuse. The study also indicates that adolescents who feel they do not fit in with their peers are at risk for substance abuse. The study also concludes that adolescents whose parents are frequently in conflict are more prone to drug-abuse behavior, as well as those adolescents with parents who have a history of mental illness. The study also reports that adolescents with overly strict or inconsistent discipline are prone to be at risk for substance abuse. It would seem that these factors are consistent with other studies that indicate poor family attachment is a risk factor for adolescent substance abuse (Comerci, Fuller, & Morrison, 1997).

In a study focusing on adolescent cigarette smoking, data from 20,745 adolescents in grades 7 through 12 were examined for risk factors and protective factors of teen cigarette smoking. The authors examined variables including grade point average, family connectedness, and peer influence. The study concluded that there was a strong protective factor for those adolescents who view themselves as having strong connections to their families. The study also found that those adolescents with higher-than-average grade point averages were less likely to engage in cigarette smoking. The variable peer influence could have a protective impact if the adolescent's peer group did not smoke. If the adolescent's peer group smoked cigarettes, then the peer group became a risk factor (Scal, Ireland, & Borowsky, 2003).

In a Colombia, South American study, 1,687 adolescents were surveyed about self-reported substance abuse. The survey was administered in their homes by officials, and scales were used to look at four specific risk categories: adolescent personality, family traits, peer factors, and cultural and ecological variables. Before examining the study's conclusion, it is instructive to take a look at the results of the question on marijuana use.

The percentage of males and females who reported marijuana use were as follows: never (46.3% males, 77.1% females); once or twice (29.5 males, 15.1% females) 3 to 12 times

(13.8% males, 5.2 % females); several times a month (3.7% males, 1.1% females); and several times a week (6.6% males, 1.5% females). (Brook et al., 1998, p. 800)

Of interest to this study is the conclusion found on family factors in the Colombian adolescent survey. It was found that a “weak” parent-child attachment was a risk factor for marijuana use as well as poor parental structure and sibling drug use being significant risk factors. The authors concluded that their findings were similar to the findings of studies in the United States on this subject (Brook et al., 1998).

The literature review provided some insight on how this current study would examine the relationships between alcohol, tobacco, and marijuana in teenagers. The literature reviewed for this study was from many sources and examined the relationships of alcohol, tobacco, and marijuana in teenagers in the United States, Australia, South America, and Great Britain. The literature review helped to shape the research questions and provided some insights on what independent variables to measure against the dependent variable marijuana. Although this current study cannot measure the “gateway effect” of the independent variables because of the cross-sectional design of the survey, the hypothesis of the gateway effect found in much of the literature review was instructive for forming our research questions.

## CHAPTER 3

### METHODOLOGY

The purpose of this study is to explore the relationships between alcohol, tobacco, and marijuana use among teenagers. This paper examined three questions: (1) Is there a relationship between demographic characteristics of the respondents (sex and race) and the attitudinal variable (family attachment) and the use of marijuana, alcohol, and tobacco? (2) Is there a relationship between the use of marijuana among the respondents and their use of tobacco? (3) Is there a relationship between the use of marijuana among the respondents and their use of alcohol?

#### Data

The data for this study came from the Evaluation of the Gang Resistance Education and Training (G.R.E.A.T.) Program in the United States, 1995-1999 (Esbensen, 2003) and was retrieved from the National Archive of Criminal Justice Data (National Archive of Criminal Justice, 1999). The data used in this study were taken from part one of the G.R.E.A.T. study.

The data were originally gathered to evaluate the effectiveness of the G.R.E.A.T. program. Eleven cities were chosen where the G.R.E.A.T. program had been taught the year before. The cities selected were: Phoenix, Arizona; Torrance, California; Orlando, Florida; Pocatello, Idaho; Will, Illinois; Kansas City, Missouri; Omaha, Nebraska; Las Cruces, New Mexico; Philadelphia, Pennsylvania; Providence, Rhode Island; and Milwaukee, Wisconsin.

In 1995 the self-enumerated questionnaires were administered to 5,935 8<sup>th</sup>-grade students at 42 schools in the 11 states. The questionnaires were all completed on a given day and were cross sectional in design. The response rate is unknown. Because the students were not selected at random, the study is considered a quasi-experimental design. The sample, however, is quite large and adds considerable statistical power to the experiment.

### Dependent Variables

The dependent variables used in the present study were the questions “ever used marijuana” and “times used marijuana.” Ever used marijuana was a nominal, dichotomous measured variable (“No or Yes”) where 1 = No, 2 = Yes, and 9 = No answer, in the G.R.E.A.T. study. The question “times used marijuana” was a numeric, ratio measured variable in the G.R.E.A.T. study. The dependent variables were two of 262 variables available in the G.R.E.A.T. study for our use in this study. The dependent variables were chosen based on the hypotheses of the present study. Missing (No answer) respondents were removed from the analysis.

### Independent Variables

The independent variables “Times used tobacco” and “Times used alcohol” were chosen to test the hypotheses with the dependent variable “Ever used marijuana.” The other independent variables, race and gender, were used as demographic variables, and parental attachment (feel lonely with family) was used as an attitudinal variable.

One independent variable was “Times used tobacco” (identified as variable V170 in the G.R.E.A.T. database) and was a ratio measure ranked from never (0) to everyday use (365). A second independent variable was “Times used alcohol” (identified as variable V172 in the G.R.E.A.T. database) and was similarly measured on a ratio level and ranked from never (0) to everyday use (365). The third independent variable, the family attachment variable “Feel lonely with family” (identified as variable V68 in the G.R.E.A.T. database), was operationalized by a Likert-type scale ranging from strongly agree to strongly disagree. A fourth independent variable was “Sex, male or female” (identified as variable V1 in the G.R.E.A.T. database) and was dichotomized as 1 = male and 2 = female. “Race” (identified as variable V2 in the G.R.E.A.T. database) was the fifth independent variable, where 1 = White/Anglo, not Hispanic;

2 = Black/African-American; 3 = Hispanic/Latino; 4 = American Indian/Native American; 5 = Asian/Pacific Islander/Oriental; 6 = Other; and 7 = Mixed. Missing values were omitted from the analyses.

### Analytical Strategy

#### Univariate

The univariate testing was focused on the variables' individual characteristics. The testing strategy was to first do frequency testing for the categorical variables such as sex and ever used marijuana. This method of testing is used to report the frequency of response to qualitative data.

Measures of central tendency testing were used to examine the mean and/or mode of variables that are nominal and provide quantitative data, such as times used tobacco, times used alcohol, feel lonely with family, and race.

#### Bivariate

The bivariate testing examined the relationship of two variables. The t-test tested for an equality of means between two groups. The Chi-square test was used to measure if the relationship between two categorical variables is significant. The Cramer's V or Phi coefficients were used to test the strength of significant relationships.

#### Multivariate

Linear regression was used to evaluate multiple independent variables' effect on the single dependent qualitative variable (times used marijuana) simultaneously. This test evaluates whether or not the relationship of the individual independent variables is significant while controlling for the other independent variables. Regression also provides the reported

coefficients of each variable and evaluates the strength of each independent variable's impact on the dependent variable.

## CHAPTER 4

### RESULTS

#### Characteristics of Respondents

The data in Table 1 depict the demographic characteristics of the 5,935 respondents. While age was not a variable included in the hypotheses for the present study, it was interesting to note that the respondents ranged from 11 years of age or younger to 18 years or older. The mean age was 13.82 years of age, with 89.3% of the sample falling within the ages of 13 and 14. Because the age range was so narrow in terms of variability, it was not used in the analyses of the hypotheses.

In examining the frequency for the variable “Sex,” it was found that the sample of 5,935 respondents was near evenly split with 48.1% responding as male and 51.9% responding as female (Table 1). In the 5,832 responses for the question on self identification of the variable “Race,” 40.4% responded as “White/Anglo, Not Hispanic,” the next largest response at 26.5% for “Black,” and 18.8% responding as “Hispanic,” “Native American,” “Asian/Pacific Islander/Oriental,” “Mixed,” and “Other” accounted for 14.3% of the responses to the “race” question. Although “White/Anglo, Not Hispanic” was by far the largest single response; if, however, the reader accepted the premise that all of the other respondents fall into a “minority” group, then the total minority group is 59.6% of the sample (Table 1).

Table 1

*Demographics*

Sex	Frequency (n)	Percent
Male	2830	48.1
Female	3054	51.9
n = 5935		
Age	Frequency (n)	Percent
11 or younger	4	0.1
12	9	0.2
13	1686	28.9
14	3530	60.4
15	577	9.9
16	25	0.4
17	1	0.0
18 or older	9	0.2
Mean	13.8	
Median	14.0	
n = 5841		
Race	Frequency (n)	Percent
White/Anglo	2355	40.4
Black	1544	26.5
Hispanic	1098	18.8
	29	

Table 1 (cont'd)

Race	Frequency (n)	Percent
Native American	134	2.3
Asian/Pacific Islander/Oriental	346	5.9
Other	97	1.7
Mixed	258	4.4
n = 5832		

Of the 5,609 individuals responding to the variable “Ever used marijuana,” 1,367 individuals or 24.4% of the total respondents reported “Yes” to having ever used marijuana, and 4,242 individuals or 75.6% reported “No” to having ever used marijuana (Table 2). Interestingly, over 11% of the respondents indicated they were frequent users of marijuana, with 8% using marijuana every 2 months, 2.2% using marijuana every week, and 1% indicating they were daily users (Table 3).

Table 2

*Frequency Table for Ever Used Marijuana*

	Frequency	Percent
No	4242	75.6
Yes	1367	24.4

n = 5609

Table 3

*Frequency Table for Times Used Marijuana*

	Frequency	Percent
None	4242	75.6
Once	265	4.7
A couple	159	2.8
A few	318	5.7
Every 2 months	450	8.0
Weekly	125	2.2
Everyday	50	1.0

Out of the 5,487 respondents for the variable “Times used tobacco,” 3,826 respondents or 69.7% reported “None” or no tobacco use. Only 129 respondents or 2.4% reported using tobacco every day. Every-day use would seem to indicate physical addiction at only 2.4% of the sample group. What is interesting is that 458 respondents or 8.3% reported using tobacco “Every three months”; this would not seem to indicate addiction (Table 4).

Table 4

*Descriptive Statistics for Times Used Tobacco*

	Frequency (n)	Valid Percent
None	3826	69.7
Once	314	5.7
A couple	226	4.1
	31	

Table 4 (cont'd)

	Frequency (n)	Valid Percent
A few	370	6.7
Every 2 months	458	8.3
Weekly	164	3.0
Every day	129	2.4

Out of the 5,460 respondents to the question “Times used alcohol,” 2,842 respondents or 52.1% reported “None” or no use of alcohol. One hundred sixty-two or 3% responded that they used alcohol weekly, and only 25 or .5% reported using alcohol every day. Table 5 also indicates that more of the respondents have tried alcohol at least once than those who have ever used marijuana or tobacco.

Table 5

*Descriptive Statistics for Times Used Alcohol*

	Frequency (n)	Valid Percent
None	2842	52.1
Once	479	8.8
A couple	442	8.1
A few	769	14.1
Every 2 months	741	13.6
Weekly	162	3.0
Every day	25	.5

n = 5460

In examining the measures of frequency for the variable “Feel lonely with family,” there were a total of 5,876 responses out of a possible 5,935. The responses indicate that only 1,807 or 30.8% responded in the affirmative to any form of “feel lonely with family” (Table 6). While 3,083 or 52.5% respondents reported at some level that they did not feel lonely with their family. Nine hundred eighty-six or 16.8% were neutral on the question of “Feel lonely with family.” The most occurring answer, or mode, was “Disagree,” with 1,733 or 29.5% of the respondents choosing this response (Table 6).

Table 6

*Frequency Table for Feel Lonely with Family*

	Frequency	Percent
Strongly disagree	1350	23.0
Disagree	1733	29.5
Neither agree nor disagree	986	16.8
Agree	1333	22.7
Strongly agree	474	8.1
Total	5876	100.0

### Analyses of Research Questions

The three research questions and subsequent hypotheses were tested using bivariate and multivariate analyses. Contingency table analyses were performed on nominal level variables, and t-tests and multiple regressions were performed on interval/ratio measured variables.

The first research question asked: *Is there a relationship between demographic characteristics of the respondents (sex and race) and the attitudinal response for family attachment (feel lonely with family) and use of marijuana, alcohol, and tobacco?* Three hypotheses were tested for this question.

Contingency table and t-test analyses were conducted to test the first three hypotheses: (1) *Male teenagers are more likely to engage in the use of marijuana, alcohol, and tobacco than female teenagers.* (2) *White teenagers are more likely to engage in the use of marijuana than non-white teenagers.* (3) *Teenagers who feel lonely with their family are more likely to engage in the use of marijuana, alcohol, and tobacco.*

A cross-tabulation for the variables “Ever Used Marijuana” and “Sex” indicated that males responded “Yes” 906 times or 32.9% and “No” 1,851 times or 67.1%. The females responded “No” 2,208 times or 73.6% and “Yes” 790 times or 26.4% to the question “Ever used marijuana” (Table 7). The data indicated that males responded yes to the question, “Ever used marijuana” 6.5% more times than females in the same survey.

Table 7

*Cross-tabulation for Ever Used Marijuana and Gender*

	Male		Female		Total	
	n	%	n	%	n	%
No	1851	67.1	2208	73.6	4059	70.5
Yes	906	32.9	790	26.4	1696	29.5
Total	2757	100.0	2998	100.0	5755	100.0

Chi-square = 29.29, 1 df,  $p < .001$ , Phi = .071

The Chi-square was significant (29.29, 1 df,  $p < .001$ ) indicating that males were significantly more likely than females to engage in this behavior. The Phi coefficient was .071 indicating a weak relationship (see Table 7).

A cross-tabulation was completed for the variables “Race” and “Ever used marijuana.” As the data in Table 8 indicate, there was a significant relationship between race and marijuana use (Chi-square = 158.18, 6 df,  $p < .001$ ). A little more than one fourth of the respondents (29.0%) indicated they had used marijuana. Native Americans, Hispanics, and Blacks were much more likely to engage in the use of marijuana than Whites (23.8%) or Asian/Oriental respondents (11.1%). The relationship was weak, however, with a Cramer’s V coefficient of .166.

Table 8

*Cross-tabulation for Race and Ever Used Marijuana*

	No		Yes		Total	
	n	%	n	%	n	%
White/Anglo	1771	76.2	554	23.8	2325	100.0
Black	974	65.1	522	34.9	1496	100.0
Hispanic	678	63.4	392	36.6	1070	100.0
Native American	81	61.8	50	38.2	131	100.0
Asian/Oriental	305	88.9	38	11.1	343	100.0
Total	3809	71.0	1556	29.0	5365	100.0

Chi-square = 158.18, 6 df,  $p < .001$ , Cramer’s V = .166

Family attachment (Feel lonely with family) and marijuana use were examined. As the data in Table 9 indicate, there was a significant relationship between respondents' attachment to their family and their use of marijuana (Chi-square = 76.9, 3 df,  $p < .001$ ). Those respondents who indicated that they felt lonely with their parents were more likely to engage in marijuana use. The Cramer's V coefficient was weak, however ( $V = .127$ ).

Table 9

*Cross-tabulation for Feel Lonely with Family and Used Marijuana*

Feel lonely with family	Used marijuana				Total	
	No		Yes		N	%
	n	%	n	%		
Strongly disagree	981	74.5	340	25.7	1321	100.0
Disagree	1275	74.8	429	25.2	1704	100.0
Agree	880	67.1	431	32.9	1311	100.0
Strongly agree	263	56.3	204	43.7	467	100.0
Total	3399	70.8	1404	29.2	4803	100.0

Chi-square = 76.904, 3 df,  $p < .001$ , Cramer's V = .127

The ratio measured dependent variables "Times used alcohol" and "Times used tobacco" were analyzed with the independent dichotomous variable "Sex" using two-tailed t-tests. As the data in Table 10 indicate, the means for the males' use of both alcohol and tobacco were significantly higher than for females. The mean for males' use of tobacco was 24.69 days per year compared to 16.25 days per year for females ( $t = 3.07$ ,  $p = .002$ ). The mean for males' use of alcohol was 11.60 days per year compared to 7.27 days per year for females ( $t = 2.80$ ,  $p = .005$ ).

Table 10

*t-test for Times Used Alcohol and Tobacco and Gender*

	Sex	N	%	Mean	Std. deviation	t	P
Times used tobacco	Male	2648	48.4	24.69	117.652	3.071	.002
	Female	2828	51.6	16.25	83.772		
Times used alcohol	Male	2647	48.8	11.60	70.233	2.800	.005
	Female	2778	51.2	7.27	40.366		

The race variable was collapsed into a dichotomous variable, “White” and “Nonwhite” in order to perform a t-test. As the data in Table 11 depict, the variables “White” and “Non-White” were significant indicators of tobacco use, with Whites reporting a higher mean of 33.31 times used per year to Nonwhites’ 12.12 times used per year ( $t = 7.51$ ,  $p < .001$ ). However, the variables “Times used alcohol” and “Race” were not significant ( $t = .911$ ,  $p = .362$ ).

Table 11

*t-test for Times Used Tobacco and Race and Times Used Alcohol and Race*

		White and non-white					
		N	%	Mean	Std. deviation	t	P
Times used tobacco	White	2155	39.7	33.31	134.706	7.511	<.001
	Non-white	3269	60.3	12.12	72.119		
Times used alcohol	White	2219	41.3	10.08	62.604	.911	.362
	Non-white	3158	58.7	8.67	50.137		

The family attachment variable (Feel lonely with family) was collapsed into two independent groups in order to conduct t-tests. Those respondents who strongly agreed or agreed with the statement that they felt lonely when they are with their family were placed in the “Yes” group and those that either disagreed or strongly disagreed with the statement were placed in the “No” group. As the data in Table 12 indicate, respondent’s attachment to their families had significant effects on their use of tobacco and alcohol. While a little over a third of the respondents affirmed they were detached emotionally from their family (37%), they had the highest mean use of tobacco and alcohol than the other respondents.

Table 12

*t-test for Times Used Tobacco and Alcohol and Feel Lonely with Family*

		N	%	Mean	Std. deviation	t	P
Times used tobacco	Feel lonely with family	1807	37.0	128.96	385.317	7.549	.000
	Does not feel lonely with family	3083	63.0	62.57	229.678		
Times used alcohol	Feel lonely with family	1807	37.0	117.83	382.268	5.555	.000
	Does not feel lonely with family	3083	63.0	68.14	242.779		

The third research question was: *Teenagers who feel lonely with their family are more likely to engage in the use of marijuana, alcohol, and tobacco.* The t-test in Table 12 for times

used tobacco and times used alcohol in relation to *feel lonely with family* would affirm, at least in part, the hypothesis that those *teenagers who feel lonely with their family are more likely to engage in the use of alcohol and tobacco*. The portion of the hypothesis concerning marijuana will be answered in Tables 13 and 14.

The second and third research questions (hypotheses) were: (1) *Teenagers who use alcohol are more likely to also use marijuana than those who do not use alcohol*. (2) *Teenagers who use tobacco are more likely to use marijuana than those who do not use tobacco*. Since it could not be determined which variable (used marijuana or used tobacco/alcohol) pre-existed the other in time (temporal priority), a matched Chi-square test was conducted with total percentages. The ratio attributes of the variables tobacco and alcohol were collapsed into four ordinal attributes: (1) never/rarely, (2) sometimes, (3) occasionally, and (4) frequently. As Tables 13 and 14 indicate, there were significant relationships with both alcohol and tobacco use and marijuana use. Those respondents who indicated they used tobacco and/or alcohol occasionally or frequently were also more likely to engage in using marijuana. The Cramer's V coefficients for both tobacco use ( $V = .422$ ) and alcohol use ( $V = .433$ ) were moderately strong associations with marijuana use.

Table 13

*Cross-tabulation for Frequency Use of Tobacco and Used Marijuana*

Frequency use of tobacco	Used marijuana					
	No		Yes		Total	
	n	%	n	%	n	%
Never/rarely	3793	81.2	879	18.8	4672	100.0
Sometimes	132	33.3	264	66.7	396	100.0
Occasionally	43	23.8	138	76.2	181	100.0
Frequently	9	8.3	100	91.7	109	100.0
Total	3977	74.2	1381	25.8	5358	100.0

Chi-square = 953.356, df = 3, p &lt; .001, Cramer's V = .422

Table 14

*Cross-tabulation for Frequency Use of Alcohol and Used Marijuana*

Frequency use of alcohol	Used marijuana					
	No		Yes		Total	
	n	%	n	%	n	%
Never/rarely	3726	69.9	833	15.6	4559	85.5
Sometimes	193	3.6	400	7.5	593	11.1
Occasionally	25	.5	140	2.6	165	3.1
Frequently	1	.0	13	.2	14	.3
Total	3945	74.0	1386	26.0	5331	100.0

Chi-square = 1000.711, df = 3, p &lt; .001, Cramer's V = .433

The literature review suggested that alcohol and tobacco were independent variables with the use of marijuana. It was because of this suggested relationship of the variables alcohol, tobacco, and marijuana that the linear regression was designed as it was in this study. Linear regression was used to examine the dependent variable “Times used marijuana” and the independent variables, Times used tobacco, Times used alcohol, Feel lonely with family, Sex, and Race to determine which of these independent variables would be the best predictor of the use of marijuana. Sex and race were dichotomous and were treated as dummy variables. As the data in Table 15 indicate, significant relationships were found between all of the independent variables and the dependent variable. The independent variables explained 38% of the variation in “Times used marijuana.” The strongest coefficient was found with “Times used alcohol” with a Beta of .357, followed by “Times used tobacco” with a Beta of .334. Interestingly, the weakest Beta was “Feel lonely with family” with a Beta of .031. Given the literature reporting the significance of this variable with drug use and the other statistical results in the present study, it was felt that this variable would be a strong predictor of marijuana use. However, according to these data, use of tobacco and alcohol are the strongest predictors of marijuana use.

Table 15

*Regression Testing of the Dependent Variable and the Independent Variables*

Independent variables	Beta	T
Times used tobacco	.334	23.584*
White	-.149	-12.135*
Times used alcohol	.357	25.475*
Feel lonely with family	.031	2.489**
Male	.071	5.782*

R = .614, R Square = .378

Dependent variable: Ever used marijuana

\*Significant at level .000 ( $p < .001$ )

\*\*Significant at level .013

The results of the regression testing in Table 15 of the dependent variable times used marijuana and the independent variables times used tobacco, white or non-white, times used alcohol, feel lonely with family, and gender provide some answers for hypotheses 3, 4, and 5. Teenagers who feel lonely with family, or use alcohol, or use tobacco are more likely to also use marijuana; therefore, hypotheses 2, 4, and 5 are affirmed.

## CHAPTER 5

### DISCUSSION

This study was undertaken to examine the relationships between alcohol, tobacco, and marijuana use among teenagers. It was hypothesized that there were significant relationships between the use of alcohol and tobacco and marijuana use. Four specific questions were examined as part of the study: (1) Was there a relationship between the admitted use of illegal marijuana by teenagers and the frequency of teenage use of alcohol and/or tobacco? (2) Was there a relationship between the use of marijuana by teenagers and the use of tobacco? (3) Was there a relationship between the use of marijuana by teenagers and the use of alcohol by teenagers? (4) Is there a positive correlation between the frequency of use of alcohol and tobacco by teenagers and the use of marijuana, controlling for race, age, gender, and parental attachment?

Question 1 asked: *Was there a relationship between the admitted use of illegal marijuana by teenagers and the frequency of teenage use of alcohol and tobacco?* The data examined indicate that there were significant relationships between alcohol, tobacco, and marijuana, thus affirming the hypothesis in question 1. The study, however, also indicates that, while both were significant, the Beta of Alcohol with a Beta of .357 was the strongest coefficient, followed by Tobacco with a Beta of .334, and then Race with a Beta of -.149. Based on these findings, the hypothesis is confirmed.

Question 2 asked: *Was there a relationship between the use of tobacco and the use of marijuana in teenagers?* While examining question number 1, it was found that the answer to question 2 was yes, there was a relationship between the use of tobacco and the use of marijuana among teenagers and it was second only to alcohol. The data affirmed the hypothesis that there was a relationship between the use of tobacco and the use of marijuana among teenagers.

Question 3 examined *if there was a relationship between the use of marijuana by teenagers and the use of alcohol by teenagers*. The relationship between the use of alcohol by teenagers and the use of marijuana by teenagers was found to be significant. The hypothesis in question 3 that there was a relationship between the use of alcohol and marijuana among teenagers is confirmed.

Question 4 examined *if there was a positive correlation between the frequency of use of alcohol and tobacco by teenagers and the use of marijuana*. The analysis of the data showed a significant relationship between both alcohol and tobacco use and the use of marijuana. The strongest relationship was between alcohol and marijuana. The use of alcohol was the best indicator among the variables of the use of marijuana. The hypotheses that there were positive correlations between the frequency of use of alcohol and tobacco by teenagers and the use of marijuana are confirmed.

### Conclusions

As hypothesized, there was a positive relationship between the teenage use of tobacco, alcohol, and marijuana. What cannot be concluded was the timing of that relationship. This study was done using cross-sectional data that were by their very nature a snapshot in time of the teenagers taking the survey. It cannot be concluded whether or not the tobacco or alcohol led to the use of marijuana or, in other terms, had a “gateway effect.” It can, however, be concluded that the use of tobacco, alcohol, and marijuana are significantly linked together.

Some other studies have suggested that the strong connection between tobacco and marijuana may be in part linked to the method of transmission of both, smoking (Cameron & Williams, 2001). I think that this area of a common transmission mechanism is one that should be followed up in other studies. We have a tendency to segregate the abuse of illegal and legal drugs, and we may be missing some obvious connections for prevention and treatment.

The study by Lindsay and Rainey (1997) that discusses the effects of nicotine as an MAO-B inhibitor, thus increasing the pleasure of certain drugs through the release of dopamine in the body, needs further investigation. This was the only such reference found during this work to such a connection; however, it may explain the strong correlations found throughout this work with cigarettes and other drug use. If nicotine does enhance the pleasure of other drugs, what implications may that have on treatment and regulation?

### Implications

What this may mean to society is that we should not look at the abuse of marijuana by teenagers in a vacuum. The use of marijuana by teenagers is closely linked to alcohol and tobacco, and perhaps they should be studied as an abuse problem together. With tobacco killing 20 times more Americans each year than all illegal drugs combined, perhaps this study should have been asking the questions with tobacco as the dependent variable (Lindsay & Rainey, 1997).

There also needs to be a commitment to seek out other variables that can account for the predictability of marijuana use by teenagers. There obviously need to be some long-term longitudinal studies to address these and many other questions concerning the problem of teenage marijuana use and the relationship to tobacco, race, age, alcohol, attachment, and gender. In follow-up studies, it would also be useful to try to explain the race variable effects on marijuana use and to possibly include a correlation with other variables that would be considered risk-taking behaviors other than substance abuse.

In the short term and from a practical standpoint, it would be prudent public policy to try to reduce teenage smoking, not only as a drug-reduction strategy but also for the ill effects of the tobacco itself. Questions should be asked in these longitudinal studies to try to learn what other variables were occurring in the teenager's life emotionally, spiritually, physically, and

academically when they made the decision to first use marijuana and/or tobacco. It would be useful to develop a scale to measure the effects of peer pressure on these decisions.

The problem of teenage abuse of tobacco, alcohol, and marijuana is a complex problem that needs to be addressed from a behavioral as well as a biological perspective. If juveniles can learn positive behaviors such as language skills and physical motor skills much better at a young age, should we be surprised that they may also learn negative behaviors such as substance abuse much easier at a young age? The problem of juvenile substance abuse needs a holistic approach from every discipline in order to make a positive change for our youth.

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