

CURRICULUM VITAE

Lindsey W. Hawkins

Education:

2001
to present Psy.D. Candidate, Clinical Psychology
Indiana State University
Terre Haute, Indiana
2006 (anticipated completion)

2001
to 2003 M.S., Clinical Psychology
Indiana State University
Terre Haute, Indiana

1996
to 2000 B.S., Psychology
University of Iowa
Iowa City, IA

Supervised Clinical Experience:

8/06-present Psychology Associate, Tanager Place
Cedar Rapids, IA

9/05-8/06 Psychology Intern, St. Louis Psychology Internship Consortium,
St. Louis, MO

8/04-7/05 Student Therapist, Hamilton Center Inc. Child and Adolescent Services,
Terre Haute, IN

9/02 - 5/04 Graduate Clinician, Psychology Clinic, Indiana State University,
Terre Haute, IN

9/02 - 5/04 Examiner, Attention Deficit Hyperactivity Disorder Clinic, Indiana State
University, Terre Haute, IN

Honors and Awards:

Member of Phi Eta Sigma Freshman Honors Society at the University of Iowa, 1997

Graduated with honors in Psychology from the University of Iowa, 2000

Affiliations and Memberships:

Member, Psychology Graduate Student Organization, Indiana State University

Student Member of the American Psychology Association

THE IMPACT OF PERSONALITY AND AFFECT ON COLLEGE STUDENTS'
MOTIVES FOR MARIJUANA USE

A Dissertation

Presented to

The School of Graduate Studies

Department of Psychology

Indiana State University

Terre Haute, Indiana

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Psychology

by

Lindsey W. Hawkins

December 2006

School of Graduate Studies
Indiana State University
Terre Haute, Indiana

CERTIFICATE OF APPROVAL

DOCTORAL DISSERTATION

This is to certify that the Doctoral Dissertation of

Lindsey W. Hawkins

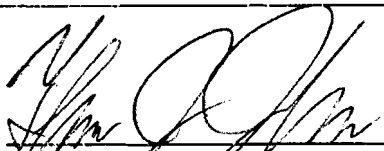
entitled

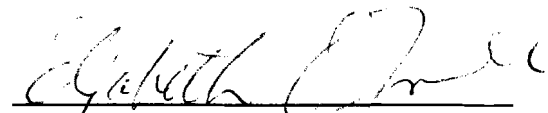
The Impact of Personality and Affect on College Students' Motives for Marijuana Use
has been approved by the Examining Committee for the dissertation requirement for the


Doctor of Psychology degree


in Clinical Psychology

December 2006

 10/24/06
Thomas V. Johnson, Ph.D. Date
CHAIR, Dissertation Committee


Elizabeth O'Laughlin, Ph.D. Date
Member, Dissertation Committee

 10/24/06
Name: Virgil Sheets, Ph.D. Date
Member, Dissertation Committee

 10/26/06
Jolynn S. Kuhlman, Ph.D. Date
Interim Dean, School of Graduate Studies

ABSTRACT

Previous research has examined the relationship between motives for drinking and alcohol use. However, less research has been conducted on the relationship between motives for marijuana use and marijuana use/problems. This study attempted to examine what predictors of marijuana use and problems are mediated by motives for marijuana use. Prior research has identified several predictors of marijuana use including psychological distress, expectancies, sensation seeking, and various personality factors. In addition, previous studies have suggested that use-related problems are not merely a function of how much of a substance one consumes, but also one's motivation for using that substance. The current study tested a series of path models treating motives for marijuana use as mediators of the relationship between various affect-related and personality variables and marijuana use in a sample of college students who had used marijuana at least once in their lifetime ($N = 398$, 60% female, mean age = 19). Results suggested that Coping motives directly predict marijuana-related problems. Also, higher psychological distress and higher Relaxation and Tension Reduction expectancies predicted using marijuana for Coping reasons. Additionally, the relationship between Openness to Experience and marijuana use and between Perceptual and Cognitive Enhancement expectancies and use were mediated by Expansion motives (i.e., using marijuana to expand awareness). Higher levels of Perceived Peer Marijuana Use and Social/Sexual Facilitation expectancies predicted Social and Enhancement motives for

marijuana use. The current study also suggested that psychological distress and Neuroticism predicts Conformity motives for marijuana use. In addition, Perceived Peer Marijuana Use and Neuroticism impacted marijuana outcomes directly as well as through alternate mediational pathways. Theoretical and practical implications of the results are present, as well as suggestions for future research.

ACKNOWLEDGMENTS

First, I must thank my family for always encouraging me to pursue my educational aspirations, particularly my doctoral degree. Without their emotional and financial support this undertaking could not have been accomplished. I would also like to thank my committee members for their professional advice and feedback that has guided me through this project. I especially would like to express my gratitude to my dissertation chair, Dr. Tom Johnson, for his encouragement, guidance, understanding, and all the extra time he gave. Your help and wisdom are very much appreciated.

Finally, I wish to thank my fiancé, Simon. You are the most supportive, selfless, and patient individual I know. Thank you for all the ways you have supported me during the last several years. Your love, support, and encouragement kept me going time and time again. This project is as much yours as it is mine.

To my mother for her kind heart and to my father for his great intelligence;
both of which are necessary in this profession

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGMENTS.....	v
LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER	
1. LITERATURE REVIEW.....	1
Introduction.....	1
Negative Health Effects of Marijuana Use	2
Motivational Model of Alcohol Use	4
Motivational Model of Marijuana Use.....	11
The Current Study	18
Additional Considerations.....	19
The Use of College Students and Self-Report Techniques	20
2. METHOD.....	23
Participants.....	23
Materials.....	25
Procedure.....	31
Confidentiality and Informed Consent of Participants.....	32

3.	RESULTS.....	34
	Analysis Plan.....	34
	Descriptive Statistics.....	35
	Tests of Path Models.....	42
4.	DISCUSSION	60
	Summary of Findings.....	60
	Replication of the Simons et al. (2005) Study	62
	Motives for Marijuana Use	64
	Marijuana Use	83
	Marijuana Related Problems	84
	Gender	87
	Implications of the Current Study	88
	Strengths and Limitations.....	92
	Suggestions for Future Research.....	96
	REFERENCES.....	99
	APPENDIXES	109
	A. Consent Form	110
	B. Demographics Form	112
	C. Marijuana Use Questions.....	113
	D. Alternate Version of the Rutgers Alcohol Problems Index.....	114
	E. Marijuana Motives Questionnaire	116
	F. Marijuana Effect Expectancy Questionnaire	117

G. Perceived Peer Marijuana Use Questions	120
H. Brief Symptom Inventory	122
I. Impulsive Sensation Seeking Scale	124
J. NEO Five Factor Inventory	125
K. Frequency Tables for Use Questions	127

LIST OF TABLES

Table	Page
1. Descriptive Statistics for Marijuana Related Variables in Marijuana User Sample	35
2. Descriptive Statistics for Affect and Personality Variables in Marijuana User Sample	36
3. Comparisons of Means and Standard Deviations for Marijuana Users Only by Gender	37
4. Correlations Among All Predictor and Criterion Variables.....	39
5. Intercorrelations Among Exogenous Predictors of Marijuana Use	41
6. Model Fit Indices for Replication of Simons et al. Study.....	45
7. Model Fit Indices for Marijuana User Sample.....	52

LIST OF FIGURES

Figure	Page
1. Hypothesized Paths Between Study Variables.....	22
2. Initial Replication of the Path Model Proposed by Simons et al. (2005).....	44
3. Final Replication of the Path Model Proposed by Simons et al. (2005)	47
4. Initial Path Model (Model 1) for Marijuana User Sample	49
5. Model 2 Adding Direct Paths to Marijuana Use and Problems	51
6. Model 3 Adding Non-hypothesized Indirect Paths	54
7. Model 4 Deleting Nonsignificant Paths	56
8. Model 4a Deleting Two More Nonsignificant Paths (Final Path Model)	57

Chapter 1

LITERATURE REVIEW

Introduction

Marijuana use is widespread in the U.S. college student population. A study conducted in 2000 showed that one fifth of all college students had used marijuana at least once in the last month (The Higher Education Center for Alcohol and Other Drug Prevention, 2003). Understanding the reasons why many college students use marijuana may offer information that could be useful in preventing marijuana problems in young adults. Therefore, this study examined the relationships between several variables such as marijuana expectancies, personality factors, and affect dysregulation and their connection to motives for marijuana use.

Simons, Correia, Carey, and Borsari (1998) developed a measure that assesses motives for marijuana use and validated its factor structure. This measure is the Marijuana Motives Measure (MMM). However, few studies have since attempted to replicate this factor structure. Chabrol, Duconge, Casas, Roura, and Carey (2005) conducted a study of marijuana use in French adolescents and young adults and found that their study supported the psychometric soundness of the MMM. The results of their exploratory factor analysis yielded a five-factor solution which was similar to that found

by Simons et al. (1998). Therefore, the factor structure of the MMM proved to be reliable in a cross-cultural sample.

There are several established predictors of marijuana use that have not yet been linked to the five motives for marijuana use. Studies done on alcohol use in a variety of populations indicate that motives for alcohol use may be mediating the relationship between predictors of alcohol use and alcohol use and problems (Cooper, 1994). Previous studies have also indicated a possible similarity between an individual's motives for drinking alcohol and his/her motives for using marijuana. Therefore, it may be possible to make the same connections between predictors of marijuana use and motives for alcohol use. However, Simons, Correia, and Carey (2000) suggested that experienced users of marijuana and alcohol discriminate between their reasons for using each of the drugs. Hence, examining motives for using marijuana separately from motives for drinking alcohol is necessary to gain a full understanding of why young adults, particularly college students, use marijuana.

Negative Health Effects of Marijuana Use

Marijuana is the most commonly used illicit drug in the United States. Overall, the percentage of young adults age 18 to 25 who had ever used marijuana was 53.8 percent in 2002 (National Institute on Drug Abuse, 2003.) According to a study conducted by the Harvard School of Public Health, 33.6% of college students had used marijuana at least once in the year 2000. The Substance Abuse and Mental Health Services Administration (SAMHSA) found that approximately 29.8% of young adults ages 18 to 25 years old report past-year marijuana use (Substance Abuse and Mental Health Services Administration [SAMHSA], 2003). In addition, 21.9% of college

students had used marijuana within the last month (The Higher Education Center for Alcohol and Other Drug Prevention, 2003).

Marijuana is a drug that has created a lot of controversy. The scientific literature regarding marijuana is highly specialized and often contradictory (McKim, 2003). Some of the research findings indicate that marijuana does not do any permanent harm.

However, some common side effects of marijuana have been found. For instance, acute adverse effects of marijuana use include anxiety, dysphoria, and panic, especially when higher doses are used (Health Risks of Marijuana Use, 1996; Kuhn, Swartzwelder, & Wilson, 1998). The short-term effects of marijuana use can also include problems with memory and learning, distorted perception, difficulty in thinking and problem solving, and increased heart rate. In addition, because marijuana impairs judgment and complex coordination, its use also increases the likelihood of accidental injury or self-destructive behavior (Kuhn et al., 1998.) In 2002, marijuana was the third most commonly abused drug mentioned in drug-related hospital emergency room visits in the United States (National Institute on Drug Abuse, 2003.)

Chronic use of marijuana has been associated with chronic bronchitis, possible irreversible cognitive impairment, various forms of oral cancer, the potential to promote cancer of the lungs and other parts of the respiratory tract, and marijuana dependency. Someone who smokes marijuana regularly may have many of the same respiratory problems that tobacco smokers do because of the irritants and carcinogens found in marijuana smoke. In addition THC, the active ingredient in marijuana, impairs the immune system's ability to fight off infectious diseases and cancer.

In addition to the negative physical consequences of marijuana use, there may also be several negative social and emotional consequences. Depression, anxiety, and personality disturbances have been associated with marijuana use. Because marijuana compromises the ability to learn and remember information, someone who is a heavy user of marijuana may experience difficulties in accumulating intellectual, job, or social skills. Students who smoke marijuana get lower grades and are less likely to graduate high school compared with their non-smoking peers (NIDA, 2003.) Results of a study conducted by Staton et al. (1999) showed that increased use of alcohol and marijuana at younger ages is related to riskier sexual activity and increased use of alcohol and marijuana as young adults. Since heavy marijuana use can lead to drug craving and withdrawal symptoms such as irritability, sleeplessness, and anxiety that make it harder for long-term users to stop using the drug (NIDA, 2003), it becomes important to aim preventive measures at individuals who do not use marijuana regularly before their use becomes more habitual.

Understanding why students use marijuana may offer information that could be useful in terms of prevention of marijuana use in college students. One way of understanding drug use is to examine the incentives or sources of reinforcement provided by drug use. This motivational model was initially applied to alcohol use, but has been applied more recently to marijuana use as well.

Motivational Model of Alcohol Use

Hull (1951) introduced the theoretical construct of *incentive motivation* as a way to account for the strength and intensity of a behavior. Hull claimed that the performance of a learned response was a function of the current attractiveness of some incentive to

perform that response. Thus an incentive refers to something that puts in motion or has a tendency to put in motion a particular action. Cox and Klinger (1988) adapted Hull's concept of incentive motivation for their motivational model of alcohol use. According to Cox and Klinger, the final, common pathway to alcohol use is motivational. Although a variety of factors contribute to one's decisions about drinking, these decisions are mostly affected by one's motives for drinking. In other words, individuals decide whether or not to drink based on the perceived attractiveness of the incentives to drink (e.g., alcohol tastes good, alcohol makes one more relaxed) as compared to the incentives for not drinking (e.g., experiencing a hangover.) More specifically, Cox and Klinger (1988) claimed that individuals decide whether or not to drink based on the effect they expect drinking to have on their emotions (e.g., increase positive affect, decrease negative affect.)

Cox and Klinger's (1988) motivational model of alcohol use suggests that the factors that have been demonstrated to have an impact on an individual's motivation to drink alcohol operate by helping to form expectations about the affective changes that will occur as a result of consuming alcohol. The concept of alcohol outcome expectancies was based on Bandura's social cognitive theory (1986). Outcome expectancies are the specific events or results that an individual expects to occur if they perform a particular behavior. Alcohol or drug outcome expectancies are therefore the effects or consequences that one expects from using a particular drug. Alcohol outcome expectancies have been shown to be consistent predictors of alcohol use (Jones, Corbin, & Fromme, 2001).

In Cox and Klinger's model (1988), expectancies are the basis of motives. Both theory and research indicate that motives and expectancies do differ (Cooper, 1994). In general, motives are expectancies. More explicitly, motives are the specific expectancies that motivate an individual's use of a substance. In other words, motives reflect the outcomes that an individual intends to produce by choosing to engage in a particular behavior. One can expect a particular outcome to occur after consuming a substance (e.g., getting a hangover after drinking alcohol), but this expectancy is not necessarily what motivates one to use the particular substance.

Studies involving both adults and adolescents have demonstrated a relationship between alcohol expectancies and patterns of alcohol consumption (Brown, Christiansen & Goldman, 1987; Christiansen & Goldman, 1983). Several studies have also shown that alcohol expectancies may mediate the influence of other risk factors on the development of problem drinking (Miller, Smith, & Goldman, 1990). Although much research has been done on how alcohol expectancies affect the consumption of alcohol, little research has examined the expectancies associated with other substances, including marijuana. However, Willner (2001) indicated that there is a significant relationship between alcohol and marijuana expectancies in that several of the expectancies that college students hold about the effects of their alcohol consumption hold for their marijuana use as well. This relationship stems from the overlapping of reasons for using marijuana with the reasons for using alcohol, such as tension reduction, mood enhancement, and social bonding. Nonetheless, there is a lack of literature examining the possible connection between an individual's motivations for marijuana use and his/her marijuana expectancies.

Cooper (1994) developed a four-factor model of motivations for alcohol use based on the conceptual model by Cox and Klinger. Cox and Klinger (1988) proposed that motives for drinking alcohol can be characterized by the valence (positive reinforcement or negative reinforcement) and the source (internal or external) of the outcomes an individual hopes to achieve by drinking. Cooper elaborated on their model by crossing these two dimensions to create four classes of motives. The first class involves internal, positive reinforcement motives (i.e. drinking to improve mood or well-being). The second class involves external, positive reinforcement motives (i.e. drinking to obtain positive social rewards). The third class involves internal, negative reinforcement motives (i.e. drinking to regulate negative emotions). Last, the fourth class involves external, negative reinforcement motives (i.e. drinking to avoid social rejection). These four classes can be reduced into the four motives for drinking alcohol that Cooper outlines: 1) enhancement motives, 2) social motives, 3) coping motives, and 4) conformity motives. The model illustrated that each of the four motives for alcohol use related to a distinct pattern of antecedents to drinking as well as drinking-related consequences.

Research conducted by Cooper (to be described more fully below) not only supported the conceptual validity of Cox and Klinger's motivational model but also illustrated that there is legitimacy in the examination of motives for drinking for clinical and research purposes. In addition, this model lends credence to a motivational perspective on alcohol use. Before we turn to applying the motivational model to marijuana use, the following sections will describe some of the variables that have been found to predict different types of motives for drinking alcohol.

Personality Factors and Motives for Alcohol Use

Personality factors have been associated with motives for alcohol use. Personality factors can affect an individual's motivation to drink alcohol because they alter the impact of the other variables that influence drinking (Cox and Klinger, 1988). For instance, one individual may have a personality similar to that of a problem drinker and also derive positive physiological effects from alcohol. Another individual with different personality characteristics but a similar physiological reaction to alcohol may be less likely than the first individual to indulge in impulsive drinking. Personality characteristics such as nonconformity, impulsivity, neuroticism, and extraversion have been linked with alcohol use. In a study by Baer (2002), a pattern of impulsivity/sensation seeking emerged that was strongly related to increased drinking among college students. Importantly, individuals high in impulsive sensation seeking have been shown to endorse high levels of enhancement motives for alcohol use (Comeau, Stewart, & Loba, 2001; Cooper et al., 1995, Read et al., 2003).

Cooper, Agocha, and Sheldon (2000) found that broad traits related to neuroticism and extraversion promoted involvement in alcohol use via distinct pathways. Neurotic individuals were prone to use alcohol as a way to cope with aversive mood states (i.e. coping motives for drinking), whereas extraverted individuals were more likely to use alcohol as a way to enhance positive affective experience (i.e. enhancement motives for drinking.) Hussong (2003) conducted a structural equation analysis that indicated that both social and enhancement motives mediate the relationship between extraversion and alcohol involvement. In addition, coping motives mediated the

relationship between neuroticism and alcohol outcomes. Thus, motives for drinking appear to mediate the relationship between several personality traits and alcohol use.

Affect and Motives for Alcohol Use

Many individuals use alcohol to reduce negative affect when they are anxious or to enhance positive affect when they are depressed (Wills and Shiffman, 1985). Cooper, Frone, Russell, and Mudar (1995) also found that individuals use alcohol to regulate both positive and negative emotions. According to Cooper et al., negative emotions have strong motivational consequences. Negative emotions elicit behaviors aimed at managing, minimizing, or eliminating the source of the problem. Often this attempt to control negative emotions results in the introduction of coping mechanisms. Cooper (1994) identified internally generated, negative reinforcement motives for drinking (e.g. drinking to reduce or regulate negative emotions). Additionally, Cooper found that drinking to regulate negative affect was positively associated with higher quantity and frequency of alcohol consumption. The findings suggest that individuals who drink alcohol to cope with negative emotions are at increased risk of experiencing drinking problems in comparison with individuals who drink primarily for social or enhancement reasons. Therefore, coping motives for drinking may mediate the relationship between an individual's affective state and his/her alcohol consumption.

Peer Relationships and Motives for Alcohol Use

Social motives for alcohol use have been well-established in both adolescent and adult samples (Cooper et al., 1992). The adolescent literature has consistently shown similarity in substance use among adolescent peers (Urberg, Degirmencioglu, & Pilgrim, 1997). Individuals, especially adolescents, may be motivated to use alcohol as a way of

avoiding criticism from their peers. In addition, individuals who have peer groups that use alcohol may be more likely to use alcohol themselves as a way of fitting in with their peers. Therefore, an individual's peer relations may relate to his/her motivations for drinking alcohol. Read et al. (2003) found that social motives for drinking mediated the relationship between perceived peer drinking environment and alcohol use in college students. These findings suggest that drinking in college is strongly influenced by the social environment and the desire for social reinforcement.

Expectancies and Motives for Alcohol Use

As mentioned earlier, Cox and Klinger (1988) theorized that people drink in order to attain certain valued outcomes. These outcomes are often a result of individuals' expectancies about the effect that alcohol will have on them. The alcohol expectancy literature has established that higher levels of an expectancy are associated with higher levels of alcohol consumption (McMahon, Jones, & O'Donnell, 1994). Based on Cox and Klinger's model, this relationship between alcohol expectancies and alcohol consumption should be mediated by individuals' motives for alcohol use. Remaining consistent with Cox and Klinger's notion that motives provide the final common pathway to alcohol use, Cooper et al. (1995) found that expectancies are important in the pathway to alcohol use and abuse to the extent that they influence specific drinking motives. In their study, the relationship between social/emotional enhancement expectancies and alcohol use was mediated by enhancement motives for drinking. In addition, the relationship between tension reduction expectancies and alcohol use was mediated by coping motives for drinking. Read et al. (2003) had similar results in that the relationship between tension reduction expectancies and alcohol problems was mediated by coping motives for

drinking. Therefore, the research on alcohol expectancies and motives for alcohol use has highlighted the importance of expectancies as direct predictors of drinking motives.

Motivational Model of Marijuana Use

The connection between expectations for reinforcement from alcohol and the onset and maintenance of drinking behaviors has already been well established (Cox and Klinger, 1988; Schafer and Brown, 1991; Goldman, 1994). The connection between marijuana expectancies and marijuana use has also been explored. Schafer and Brown (1991) identified six categories of marijuana expectancies associated with marijuana use: 1) cognitive and behavioral impairment; 2) relaxation and tension reduction; 3) social and sexual facilitation; 4) perceptual and cognitive enhancement; 5) global negative effects; and 6) craving and physical effects. Similar to the connection between alcohol expectancies and motives for drinking alcohol, these marijuana expectancies might also function as motives for marijuana use. Therefore, it becomes important to examine the motives for marijuana use in order to learn more about the onset and maintenance of marijuana use.

Stewart, de Wit, and Eikelbloom (1984) interpreted drug-taking behavior as an incentive-motivational phenomenon. In other words, psychoactive drugs and the conditioned stimuli associated with them generate positive appetitive states that maintain drug-taking behavior. However, relatively few researchers have examined the motives underlying the use of marijuana. As mentioned earlier, Newcomb, Chou, Bentler and Huba (1988) demonstrated that several of the reasons that adolescents use alcohol overlap with the reasons that they use marijuana. These reasons included social bonding, tension reduction, and mood enhancement. In addition, Newcomb et al. (1988) proposed a

distinct motive for marijuana use due to marijuana's psychedelic properties that were not pertinent to alcohol use. This motive for marijuana use was termed the expansion of perceptual and cognitive experience.

Simons, et al. (1998) adopted Cooper's four-factor model of motives for drinking alcohol for use in examining marijuana motives among college students. A fifth factor, expansion of perceptual and cognitive experience, was added based on Newcomb's research. The result was a five-factor motives for marijuana use measure. Simons et al. (1998) established the concurrent validity of their marijuana motives measure by demonstrating significant relationships between marijuana motives and marijuana use and use-related problems. They also successfully demonstrated the construct validity of the fifth factor of expansion motives for marijuana use by conducting a factor analysis that supported the uniqueness of the expansion motives from motives for enhancing positive affect, social enhancement, coping, and social conformity. In addition, Simons et al.'s five factor marijuana motives measure helped to illustrate the discriminant validity of the marijuana motives and the alcohol motives by finding that different patterns of relationships emerged between the two drugs. For instance, social and conformity motives were significant predictors of alcohol use but not significant predictors of marijuana use. The findings also suggest that marijuana motives are useful constructs for understanding both marijuana use and consequences stemming from marijuana use. For example, the data from their sample suggested that individuals who use marijuana for social reasons may be especially in danger of experiencing negative consequences related to their marijuana use (Simons et al., 1998).

Personality Factors as a Predictor of Marijuana Use

Previous research on marijuana use has revealed several predictors of marijuana use. One of these predictors is personality characteristics. At least three of the five factors in the Big Five model of personality have been shown to be linked with marijuana use, specifically openness to experience, agreeableness, and extraversion. Flory, Lynam, Milich, Leukefeld, and Clayton (2000) found that symptoms of marijuana abuse were associated with low extraversion and high openness to experience. This link between marijuana use and openness to experience was also established by Grossman and Eisenman (1971). Another study showed that among high school students, agreeableness was significantly negatively correlated with marijuana use (Austin et al., 2003). In addition, sensation seeking has consistently been identified as a risk factor underlying drug and alcohol use among teenagers. Galizio, Rosenthal, and Stein (1983) also found that sensation seeking was correlated with frequency of marijuana use in college students.

Relating Personality Factors to Motives for Marijuana Use

Little research has been conducted on how personality factors relate to motives for marijuana use. However, Grossman and Eisenman (1971) hypothesized that marijuana use is related to openness to experience in college students. Undergraduate marijuana users have been shown to have greater creativity as well as an increased fantasy life compared to non-users (Eisenman, Grossman, & Goldstein, (1980). As marijuana contains fantasy-facilitating psychedelic properties, it is reasonable to hypothesize that individuals who are more open to these types of creative experiences may seek to use marijuana in order to expand their typical view of reality. Thus, an

individual that scores high on a personality measure examining their openness to experience would likely also indicate that they use marijuana for its expansion properties.

Few studies have explored the connection between drug use and the personality factors of conscientiousness and agreeableness. Flory et al. (2002) found that symptoms of alcohol abuse were associated with low conscientiousness. In addition, symptoms of marijuana abuse were also associated with lower conscientiousness as well as lower agreeableness. Stewart and Devine (2000) found that enhancement motives and social motives for drinking alcohol were negatively correlated with conscientiousness. Their results also indicated that enhancement motives were predicted by low conscientiousness. It has also been shown that individuals low in agreeableness reported stronger coping motives for drinking and that individuals low in conscientiousness reported stronger coping and enhancement motives for drinking alcohol in a sample of individuals at high risk for developing alcohol abuse/dependence (Loukas, Krull, Chassin, & Carle, 2000). However, no studies to date have evaluated the possible relationship between conscientiousness and agreeableness and the various motives for using marijuana. Therefore it is unclear how agreeableness and conscientiousness may relate to motives for marijuana use. Nevertheless, due to the similarities between an individual's motives for drinking and the motives for using marijuana shown in other studies, one can assume that agreeableness and conscientiousness will also be linked to enhancement, social, and/or coping motives for marijuana use.

High intensity seeking and low anxiety sensitivity have been shown to predict enhancement motives for alcohol use in adolescents (Comeau, Stewart, & Loba, 2001). In addition, Andrucci, Archer, Pancoast, and Gordon (1989) concluded that sensation

seeking is closely related to experimenting with drugs to seek out novel and varied experiences and stimulation. This enhancement motive for drug use was closely tied to sensation seeking in their sample of 14 to 18-year olds. Therefore, the literature has shown sensation seeking to be linked to enhancement motives for drug use, which includes marijuana use.

Affect Dysregulation as a Predictor for Marijuana Use

Another predictor of marijuana use is affect dysregulation. Green and Ritter (2000) found that the frequency of marijuana use was not significantly associated with increased depression. However, Simons and Carey (2002) found that affect dysregulation increased the problems associated with marijuana use among young adults. Their results confirmed the results obtained by Green and Ritter in that affect lability was not found to be significantly correlated with the frequency of marijuana use, only with the problems associated with marijuana use. On the other hand, Wills, Sandy, Yaeger and Yaeger (1999) found that high negative affect was related both to higher initial levels of substance use and to greater increases in substance use over time. In a study conducted by Patton et al. (2002), marijuana use that occurred weekly or more frequently in adolescents resulted in an approximately twofold increase in risk for later depression and anxiety.

Relating Affect Dysregulation to Motives for Marijuana Use

Once again, not much research has been conducted on the link between affect dysregulation and motives for marijuana use. Green and Ritter (2000) found that individuals who use marijuana to cope with their problems were more depressed than those who did not use marijuana to cope with their problems. Like Green and Ritter,

Wills et al. (1999) also indicated that the relationship of affect to marijuana use was mediated through coping motives.

Chabrol et al. (2005) examined the relationship between marijuana use, motives for marijuana use, and anxious and depressive symptomatology. They found that anxious and depressive symptomatology and coping motives were not linked to marijuana use. Their findings suggest that motives are more important than psychopathology in predicting marijuana use in adolescents and young adults. However, they did find that boys who endorsed using marijuana for enhancement of positive affect and pleasure seeking used marijuana more often whereas girls who endorsed using for enhancement of self-awareness used marijuana more often.

Recently, Simons, Gaher, Correia, Hansen, and Christopher (2005) created a structural model that examined the relationships between marijuana use, marijuana problems, coping and enhancement motives, and various affective variables. Consistent with previous research, they found that impulsivity was significantly associated with marijuana problems. However, whereas alcohol-related problems were associated with affect lability, marijuana problems were not. In terms of motives for marijuana use, coping motives were a significant predictor of use and significantly mediated the relationship between negative mood regulation and both marijuana use and marijuana-related problems. In their study, marijuana enhancement motives were not significantly predicted. This highlights the importance of other predictors of motives not included in Simon's et al.'s model, including substance use expectancies and other personality characteristics.

Peer Relationships as a Predictor of Marijuana Use

A third known predictor of marijuana use involves peer relations. Research on peer influence has shown that associating with friends who use drugs is a significant predictor of substance use, especially among adolescents and young adults (Brooks et al., 1997). In addition, peer sensation seeking has been shown to contribute to adolescents' use of marijuana (Donohew et al., 1999).

Relating Peer Relationships to Motives for Marijuana Use

The findings of a study conducted by Donohew et al. (1999) suggest that the process of using alcohol and other drugs involves peer network factors. Andrews, Tildesley, Hops, and Li (2002) suggest that the substance use of one's peers has an effect on the subsequent substance use of a young adult. Willner (2001) concluded that exposure to positive drug-related opinions and attitudes may increase positive marijuana expectancies. Therefore, some college students will form positive opinions about marijuana use by perceiving their peers as enjoying using marijuana. This study hypothesized that these positive opinions will in turn lead to these college students using marijuana as a way to connect with their peers that also use marijuana. In other words, one's perceived peer marijuana use, or perceiving one's peers as being marijuana users, may result in an individual using marijuana for social reasons.

Expectancies as a Predictor of Marijuana Use

A fourth predictor of marijuana use has been shown to be marijuana expectancies. All six of Schafer and Brown's (1991) marijuana expectancies predicted greater marijuana use. It has been shown that alcohol expectancies predict motives for alcohol

use, and the literature implies that marijuana outcome expectancies should also predict motives for marijuana use.

Relating Marijuana Expectancies to Motives for Marijuana Use

Schafer and Brown (1991) outlined relaxation and tension reduction as expected effects of marijuana use. Cooper et al. (1992) illustrated a connection between tension reduction expectancies and coping in relation to the use of alcohol. In other words, the authors found that coping motives for alcohol use mediated the relationship between tension reduction expectancies and alcohol outcomes. It could be hypothesized, then, that tension reduction expectancies may also lead to coping motives for marijuana use. In addition, a relationship between social reinforcement expectations about drinking and social motives for drinking has been established (Read et al., 2003). Therefore, there may also be a connection between social facilitation expectancies for marijuana use and social motives for marijuana use. Shafer and Brown (1991) also empirically verified expectancies of perceptual and cognitive enhancement from marijuana use. It was hypothesized that these perceptual and cognitive enhancement expectancies may be associated with enhancement motives for marijuana use.

The Current Study

The next logical step in the substance use literature was to continue Simons et al.'s work (1998) by confirming and further validating the motives for marijuana use. This step is reasonable considering the strong empirical support for the motivational model of alcohol use, the importance placed in the literature on understanding one's motives for the use of various substances, and the high rates of marijuana use in various college populations. Previous studies have indicated that the conformity motive for

alcohol and marijuana use generally receives relatively low rates of endorsement (Simons et al., 1998; Cooper, 1994). However, this study included all five motives for marijuana use. These motives are coping motives, enhancement motives, social motives, conformity motives and expansion motives.

Additional Considerations

The primary purpose of this study was to identify whether motives for marijuana use mediate the relationship between various predictor variables and marijuana use and problems. However, there was also the potential that other variables may affect the relationship between the predictor variables and marijuana use/problems. In their review of data from the National Longitudinal Survey of Youth, Hughes, Day, Marcantonio, and Torpy (1997) found that marijuana is used by substantially greater numbers of men than women aged 19 to 24 years. In a study conducted by Douglas and Collins (1997), current marijuana use also occurred significantly more often among male students than among female students. Also, Cooper (1994) found that conformity motives are more strongly related to alcohol use indexes in men, and Newcomb et al. (1988) found that coping motives were more strongly related to use of alcohol in women. Unfortunately, there is little research examining the effects of gender on motives for marijuana use. Simons et al. (1998) found that the relationship between coping motives and marijuana use was higher in women than in men, which is similar to the results found in the alcohol literature. Given that previous research examining motives for alcohol and marijuana use has examined the effect of gender, gender was included as a variable in the current study.

The Use of College Students and Self-report Techniques

Many researchers argue against the generalizability of results obtained from samples comprised of college students. However, Cooper's (1994) initial work was done on high school students and community adults first and only later applied to college students. Therefore, the motivational model appears to have relevance for a broad range of populations. In addition, the high rates of marijuana use among this population indicate that this population may benefit from research that furthers knowledge about college students' motives for marijuana use. Increased awareness of the various motives for marijuana use and the predictors of these motives may better inform interventions designed to target individuals experiencing problems stemming from their marijuana use. Because of the connections that gender has to marijuana use, it was important to consider the possibility that gender may also affect the relationship between marijuana motives and marijuana use.

The current study required participants to indicate their motives for marijuana use, frequency of marijuana use, and problems stemming from marijuana use through self-report, which raises the question of the validity of the results that are self-reported. Johnston and O'Malley (1985) indicated that there is a large body of evidence demonstrating that self-reported drug use is legitimate when participants' confidentiality is assured. In addition, Cooper (1994) indicates that a brief, reliable self-report measure of drinking motives could be of considerable utility for both clinical assessment and research purposes. This same conclusion could be drawn about a self-report measure of marijuana motives. As Mash and Terdal (1976) indicated, self-reports are efficient, cost-

effective, and may provide the only entrance to an individual's internal motivations, which is what this study was trying to access.

The current study examined the relationships among several distal predictors of marijuana use, the motives for marijuana use outlined by Simons et al. (1998), amount of marijuana consumption, and problems related to marijuana use. Specific hypotheses (as shown in Figure 1) included: 1) Coping motives for marijuana use will directly predict the number of problems associated with marijuana use; 2) Enhancement motives will mediate the relationship between Impulsive Sensation Seeking and marijuana use and between Extraversion and marijuana use; 3) Depression and Anxiety (as measured by the Brief Symptom Inventory), Neuroticism, and Relaxation and Tension Reduction expectancies will predict marijuana use via Coping motives; 4) Expansion motives will mediate the relationship between Openness to Experience and marijuana use and between Perceptual and Cognitive Enhancement expectancies (PCE) and marijuana use; 5) Social motives will mediate the relationship between Perceived Peer Marijuana Use and marijuana use and between Social and Sexual Facilitation expectancies and marijuana use; and 6) Agreeableness and Conscientiousness will predict marijuana use via Conformity motives.

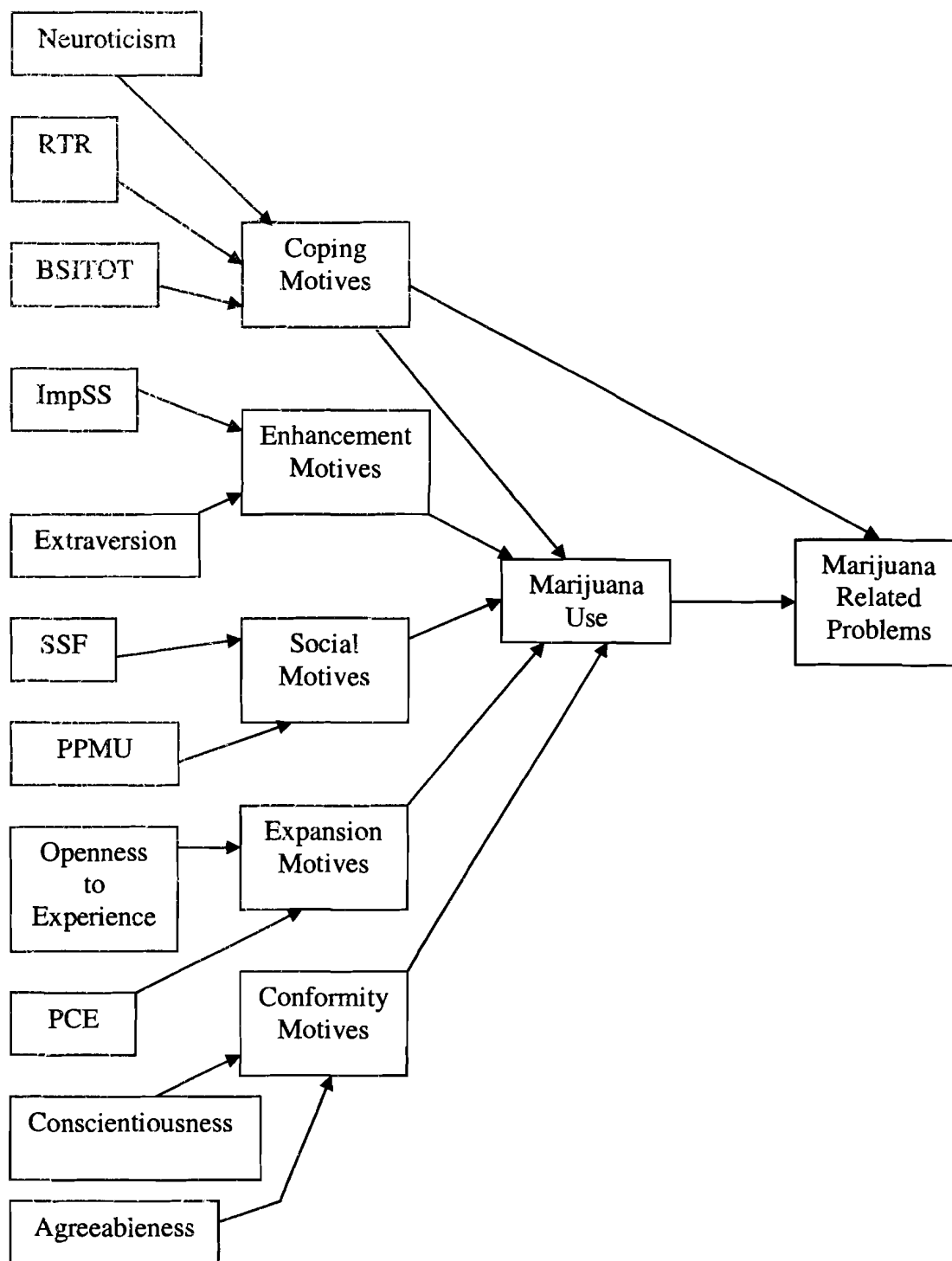


Figure 1. Hypothesized paths between study variables. Note. RTR = Relaxation and Tension Reduction Expectancies; BSITOT = Brief Symptom Inventory Total Score; ImpSS = Impulsive Sensation Seeking; SSF = Social and Sexual Facilitation Expectancies; PPMU = Perceived Peer Marijuana Use; PCE = Perceptual and Cognitive Enhancement Expectancies

Chapter 2

METHOD

Participants

Participants in the current study were drawn from an initial sample of 782 undergraduate students enrolled at a mid-sized Midwestern university who were recruited from various lower-level and upper-level psychology classes (e.g. Introduction to Psychology, Abnormal Psychology, Personality). All members of the initial sample participated in the research either for partial fulfillment of course requirements or for the opportunity to earn extra credit in a particular course.

In order to participate, individuals needed to be university students who were at least 18 years of age. Other than age, no exclusion criteria were imposed. The initial sample was predominantly female ($N = 481$, 61.5%) with a modal age of 19 ($n = 310$, 39.6 %); 28.1% were 18 years old, $n = 220$; 16.4% were 20 years old, $n = 128$. Caucasians comprised 79.5% of the initial sample ($n = 622$). The rest of the initial sample was made up of African-Americans (13.9%, $n = 109$), Africans (0.4%, $n = 3$), Asian-Americans (0.5%, $n = 4$), Asian/Pacific Islanders (0.3%, $n = 7$), Native Americans (0.3%, $n = 2$), and Mixed Race individuals (1.3%, $n = 22$). Three individuals did not disclose their ethnicity.

The original sample of 782 students included 384 students who had never tried marijuana in their lifetimes and 398 students who had used marijuana at least once in their lifetimes. The 398 students who had used marijuana at least once in their lifetimes comprised the final sample with which data analyses were conducted. It should be noted that although these 398 students had used marijuana at least once in their lifetimes, the majority of these individuals were not current users of marijuana. In fact, approximately half (53.6%) of the final sample had not used marijuana in the past 30 days (see Appendix K).

Forty-nine point five percent of the women in the initial sample had used marijuana at least once in their lifetime, while 55.5% of men had tried marijuana ($\chi^2 = 2.64$, $df=1$, $p<.10$). Although only 10 individuals in the initial sample identified themselves as Hispanic or Latino, 80% of these individuals (8/10) reported using marijuana at least once in their lifetimes. Forty percent of the Asian individuals in the initial sample had tried marijuana. African-American and Caucasian students reported similar use of marijuana (51.4% of African-Americans and 51.6% of Caucasians).

In the final sample of 398 individuals who had tried marijuana at least once in their lifetimes, the modal age was 19 years. The mean age for the final participant pool ($N = 398$) was 19.39 years ($SD = 1.34$). There were 238 females (59.8%) and 160 males (40.2%) in this final sample. Seventy-nine point seven percent were Caucasian and 13.6% were African American. Only 2.5% of the final sample was Hispanic or Latino and 3.7% of the final sample identified themselves as Mixed Race. Less than 1 % of the sample identified themselves as Asian, Native American or other categories. It should

also be noted that of the 398 participants in the final sample, only 6% were psychology majors.

There were no significant differences by race in marijuana use or problems for most of the proposed exogenous or mediating variables. Therefore, race was not included in the path model.

Materials

Demographics Form

Participants were asked to provide demographic information regarding their age, gender, race, and academic major in order to allow for the assessment of exogenous variables that may affect the relationship between predictors of marijuana use and marijuana use and problems (see Appendix B).

Use Measures

Substance use behavior was assessed by self-report. Simons et al. (1998) used a 9-point anchored rating scale to assess for marijuana use in the past six months, with options ranging from 1 = no use to 9 = more than once a day (see Appendix C). They also used a 9-point anchored rating scale to assess lifetime experience using marijuana, with options ranging from 1 = no use to 9 = 100 or more times (see Appendix C). Additionally, average use of marijuana in the past 30 days was assessed by a 9-point anchored rating scale, with options ranging from 1 = no use to 9 = more than once a day (see Appendix C). The percentages showing different frequencies of use in the sample of marijuana users can be found in Appendix K. For analyses in the current study, a marijuana use composite was created as the mean of the standard scores for six months use, lifetime use, and past 30-day use. The alpha coefficient for composite use was .92.

Problem Measure

Marijuana-related problems were assessed using a modified version of the Rutgers Alcohol Problem Index (RAPI) that was adapted to assess problems with marijuana use (Marijuana Problem Index; see Appendix D). This measure has also been used in previous studies examining marijuana-related problems (Simons et al., 1998; Simons et al., 2005). The Marijuana Problem Index is an 18-item measure that examines problems stemming from marijuana use. In the present study, problems that have occurred from lifetime use and problems that have occurred from past 6-month use were assessed separately. Respondents were to answer “yes” or “no” to various statements regarding their marijuana use (e.g., “Not able to do your homework or study for a test”, “Neglected your responsibilities”, “Felt that you needed more than you used to use in order to get the same effect”). The predictive validity of these problem indexes is supported by their relationships with other use-related problems, such as consumption of marijuana while driving (Johnson & White, 1989). Alpha coefficients for lifetime problems and problems within the last six months were .84 and .87, respectively. A marijuana-related problems composite was created as the mean of the standard scores for lifetime problems and problems occurring in the last six months. Cronbach’s alpha coefficient for composite problems was .86.

Motives Measure

Simons et al.’s (2000) marijuana motives measure is a 25-item questionnaire assessing five motives for using marijuana. This measure was adapted from Cooper’s (1994) Drinking Motives Measure for marijuana by substituting the wording “use marijuana” for “drink.” In addition, Simons et al. created a fifth Expansion motives scale

consisting of 5 items. Each item has a 5-point response option, ranging from 1 (Almost never/never) to 5 (Almost always/always). Scores for each scale were computed as the mean of responses to the items on that scale. Participants are instructed to consider all the times they have used marijuana and to indicate how often they have used marijuana for each reason (see Appendix E). The motives and representative items are as follows: enhancement (e.g., "I use marijuana to get high"), social (e.g., "I use marijuana to be sociable"), coping (e.g., "I use marijuana to forget my worries"), conformity (e.g., "I use marijuana so that others won't kid me about not using marijuana"), and expansion (e.g., "I use marijuana to be more open to experiences"). Simons et al. (1998) illustrated that their marijuana motives measure has good concurrent validity as well as construct validity and high internal consistency for the expansion subscale. Cronbach's alphas indicated substantial internal consistency for the marijuana motives scales, with alphas ranging from 0.85 (marijuana conformity motives) to 0.93 (marijuana expansion motives). Alpha coefficients in the current sample were .91 for enhancement, .84 for social, .89 for coping, .80 for conformity, and .89 for expansion.

Personality Measures

Personality factors that may contribute to motives for using marijuana (e.g., openness to experience, conscientiousness, agreeableness) were assessed using the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1989). The NEO-FFI is a 60-item self-report personality inventory which measures the factors of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness (see Appendix J). The study examined how all five of these personality factors influence participants' motives for using marijuana. Each item on the NEO-FFI is rated on a 5-point scale from 0 to 4,

with verbal anchors of strongly disagree, disagree, neutral, agree, and strongly agree. In the current study, scores for each factor were computed as the mean of the items for that factor. Higher scores on each subscale indicate a greater contribution of that dimension to one's personality. Each of the five scales have been found to have reasonable internal consistency and convergent and discriminant validity (Costa & McCrae, 1989). Alpha coefficients for the NEO-FFI were .70 for Neuroticism, .53 for Extraversion, .04 for Openness to Experience, .49 for Agreeableness, and .59 for Conscientiousness.

Due to human error, the last 29 items on the NEO-FFI were omitted from the questionnaire that was administered to study participants. However, 7 of the 12 Neuroticism questions and 6 of the 12 questions assessing Openness to Experience, Conscientiousness, Agreeableness, and Extraversion were represented. Since half of the items assessing each of the five personality constructs were still included on the questionnaire, statistical analyses involving the NEO-FFI could still be conducted.

The Impulsive Sensation Seeking Scale (ImpSS; Zuckerman, 1994) is a self-report measure containing 19 true-false items (see Appendix I). An advantage of this scale is that all items are of a general type and do not specify particular activities like drinking, drug use, or sex. In addition, it focuses only on sensation seeking and excludes items measuring constructs such as aggression-hostility and activity that were not examined in the present study. The ImpSS scale has internal reliability coefficients ranging from .77 to .82. The ImpSS has been shown to correlate highly with the SSS Form V Total Score ($r = .66$) and moderately with the various scales of the SSS ($r = .43-.45$). ImpSS appears to measure the general sensation-seeking tendency and is a useful short, true-false form for the general sensation-seeking trait. In the present study, scores

for the sensation seeking trait were computed as the mean across all 19 items of the ImpSS. Cronbach's alpha was .81.

Expectancies Measure

Schafer and Brown (1991) developed a Marijuana Effect Expectancy Questionnaire (MEEQ) that identified the six marijuana expectancies discussed earlier. This measure was used in the current study to identify the expectancy effects of marijuana use in a college population. The MEEQ provides a means of examining the range of expectancies associated with marijuana use. The findings of the research examining the MEEQ as a way to measure marijuana expectancies are consistent with expectancy theory in that the marijuana effect expectancies were shown to be related to the marijuana use patterns of the participants.

The MEEQ is a 78-item measure that assesses six domains of marijuana effect expectancies including Cognitive and Behavioral Impairment (e.g., "Marijuana slows thinking and actions"), Relaxation and Tension Reduction (e.g., "Marijuana gives me a mellow feeling"), Social and Sexual Facilitation (e.g., "Smoking marijuana makes me feel like part of the group"), Perceptual and Cognitive Enhancement (e.g., "I become more creative and imaginative on marijuana"), Global Negative Effects (e.g., "Marijuana tastes and smells bad"), and Craving and Physical Effects (e.g., "Marijuana does not cause lung problems"; see Appendix F). Response options were on a 5-point scale ranging from Agree Strongly to Disagree Strongly. Participants were asked to answer the questions regarding expectancies whether or not they had ever tried marijuana. For the individuals who have never had actual marijuana experiences, they were asked to answer in terms of their beliefs about how marijuana can affect someone. For analyses in the

current study, scores for each scale were computed as the mean of responses to the items on that scale. The MEEQ has generally good psychometric properties with adults (Schafer & Brown, 1991). The MEEQ shares several common expectancy domains with the Alcohol Expectancy Questionnaire, demonstrating its convergent validity. In addition, Aarons, Brown, Stice, and Coe (2001) demonstrated that the MEEQ scale scores discriminated well between primary marijuana users and primary stimulant or alcohol users, illustrating the measure's discriminant validity. Their psychometric evaluation of the MEEQ concluded that the MEEQ is a psychometrically sound measure of marijuana effect expectancies. Two year temporal stability for the MEEQ ranges from .47 to .50 for the six expectancies. Internal consistency was assessed by using Kuder-Richardson-20 coefficients, which ranged from high to moderate (0.82 to 0.66) for the MEEQ (Aarons et al., 2001). Cronbach's alphas for the current sample were .85 for Cognitive and Behavioral Impairment, .81 for Relaxation and Tension Reduction, .71 for Social and Sexual Facilitation, .73 for Perceptual and Cognitive Enhancement, .76 for Global Negative Effects, and .59 for Craving and Physical Effects.

Measure of Symptoms of Psychopathology

The Brief Symptom Inventory was originally designed to reflect psychological symptom patterns of psychiatric and medical patients. The BSI instrument is especially appropriate in situations where testing procedures demand brevity. The BSI instrument is also frequently used in measuring patient progress during treatment or in the assessment of treatment outcomes. The BSI was used in the current study to assess the levels of symptoms of psychological distress in the sample of college students. This measure was chosen because of its brief nature and the fact that it is a well-validated self-report

measure that indicates how much an individual has been bothered by their depressive and anxious symptoms in the past few weeks. The BSI is a 53-item self-report symptom inventory that assesses nine primary symptom dimensions (see Appendix H). The instrument is graded on a 5-point scale ranging from 0 ("not at all") to 4 ("extremely") with a higher score indicating greater severity of symptoms. In the current study, we used the total score because of the high intercorrelations among the subscales in the current sample. The scores were computed as the mean across all 53 BSI items. The BSI has established reliability and has shown convergent and predictive validity in many studies. Cronbach's alpha for all nine BSI dimensions combined was .95.

Perceived Peer Marijuana Use Measure

The perceived peer marijuana use measure is a composite of six self-report items adapted from perceived peer drinking environment measures previously used by Jessor, Jessor, and Donovan (1981). These items all use a five-point Likert scale to inquire about peer perceptions of marijuana use and perceived peer marijuana use (see Appendix G). Examples of items comprising this measure include: "How do most of your friends feel about using marijuana?" and "How much pressure do you feel from your friends for you to use marijuana more than you want to?" The Perceived Peer Marijuana Use score for the present study was computed as the mean score across all five items. Alpha coefficient was .80 for perceived peer marijuana use.

Procedure

Participants were recruited from undergraduate psychology courses that either required research participation or provided extra credit to students. Students interested in participating signed up for one of several mass testing sessions that were implemented

until enough participants were recruited. Participants completed the questionnaires in large groups. However, students were seated every other seat to ensure confidentiality of their answers. Since all of the measures being used in this study have been established through prior research, piloting of the questionnaires was not necessary. However, piloting was completed to evaluate how long the full battery of questionnaires takes to complete. Questionnaires were coded by a unique number rather than by name.

Confidentiality and Informed Consent of Participants

Since the participants were providing information on their participation in an illegal activity (i.e. using marijuana) it was necessary to take extra measures to guarantee the confidentiality of everyone who participated. These measures involved using codes instead of names on the questionnaires that the participants completed, as well as not obtaining signatures on the consent forms so that we had no written record of study participant's names. This procedure guaranteed that there was no way for each questionnaire to be linked with the individual who completed it. This information regarding the protection of the participants' confidentiality was thoroughly described to the participants in the consent form and in the testing sessions.

An informed consent sheet was created using language understandable to the participants that explained the nature of the research, the risks and potential benefits of participating in the research, and the participants' complete freedom to withdraw from participation in the study at any time. All participants were instructed to read this consent form before they participated in the research. Each participant was provided with his/her own copy of the consent form. Participants were encouraged to contact the individuals whose names and contact phone numbers appeared on their informed consent sheet if

interested in the results of the study. A final part of the informed consent process involved referring any participant who had concerns about their substance use to counseling services at the Indiana State University Counseling Center, the Indiana State University Psychology Clinic, or the Hamilton Center in Terre Haute, Indiana.

Chapter 3

RESULTS

Analysis Plan

This study used path analysis to examine whether the effects of various predictors of marijuana use are mediated by motives for marijuana use. The section on descriptive statistics begins by presenting means, standard deviations, skewness, and kurtosis statistics for the main variables in the present study. Means are presented for the final sample of marijuana users (lifetime use, use in the past 6 months, and use in the past 30 days), and for lifetime problems and problems within the last six months associated with marijuana use. Means by gender in the final sample are also presented. Finally, bivariate correlations for each variable measured in the study are presented.

A path analysis was conducted using EQS to assess the proposed fit of the hypothesized path diagram. The path diagram followed the recommended procedure of establishing a model that is grounded in theory regarding the causal relationships among a set of variables. The path analysis in this study provided estimates of the magnitude of the hypothesized effects, with the estimates obtained conditional on the model being correct. In addition, analyses were conducted to test whether the hypothesized model was consistent with the observed data. Analyses were also conducted to replicate previous findings by Simons et al. (2005).

Descriptive Statistics

Table 1 provides the means, standard deviations, univariate skew, and kurtosis for the marijuana related variables used in the present study.

Table 1

Descriptive Statistics for Marijuana Related Variables in Marijuana User Sample

	Mean	SD	Skewness	Kurtosis
Marijuana Use	2.14	.92	1.03	-0.21
Marijuana Related Problems	1.03	.93	2.08	5.28
Enhancement Motives	2.94	1.30	-0.09	-1.29
Social Motives	2.00	.96	.88	.06
Coping Motives	1.88	1.01	1.18	.63
Conformity Motives	1.41	.63	2.35	6.40
Expansion Motives	1.54	.86	1.98	3.38

Note. $N = 398$

Table 2 provides the means, standard deviations, univariate skewness, and kurtosis for the endogenous affective and personality variables that were examined in the present study.

Table 3 provides the means, standard deviations, and simple t-test comparisons of the means for individuals by gender. These comparisons suggest a significant difference between the means of men and women on numerous measures, including various marijuana use variables (peak quantity consumed in lifetime, in past six months, and in past 30 days). Men had significantly higher levels of marijuana use in their lifetime. Men also had used more marijuana than women both in the past six months and in the past 30 days. Another difference is that men had a higher number of marijuana related problems overall than women. In this study, men and women also differed significantly in the amount that they endorsed enhancement, social, and expansion motives for

marijuana use. Males had higher Enhancement, Social, and Expansion motives, as well as higher levels of Perceived Peer Marijuana Use as compared to females. Many of the personality related scales were significantly higher among females than males, including Impulsive Sensation Seeking, Neuroticism, Extraversion, and Agreeableness.

Table 2

Descriptive Statistics for Affect and Personality Variables in Marijuana User Sample

	Mean	SD	Skewness	Kurtosis
Impulsive Sensation Seeking (ImpSS)	1.49	.22	.04	-0.64
Relaxation and Tension Reduction Expectancies (RTR)	3.53	.76	-0.76	1.15
Social and Sexual Facilitation Expectancies (SSF)	3.10	.64	-0.20	-0.13
Perceptual and Cognitive Enhancement Expectancies (PCE)	3.11	.72	-0.57	.60
Perceived Peer Marijuana Use (PPMU)	2.88	.96	.11	-0.55
Neuroticism	2.82	.77	-0.91	-0.13
Extraversion	3.59	.60	-0.27	-0.04
Openness to Experience	3.13	.56	-0.04	.09
Agreeableness	3.38	.60	.00	-0.33
Conscientiousness	3.30	.64	.06	-0.12
Brief Symptom Inventory Composite (BSITot)	1.48	.55	1.54	1.96

Note. $N = 398$.

Relationships among all of the predictor and criterion variables are shown in Table 4. Marijuana use was positively correlated with marijuana problems and with four of the five motives for marijuana use; marijuana use was negatively correlated with Conformity Motives. Marijuana problems were also highly positively correlated with all motives except Conformity. Both use and problems were also positively correlated with all three marijuana expectancies variables and Perceived Peer Marijuana Use. Surprisingly, both marijuana use and problems were found to have a significant negative

Table 3

Comparisons of Means and Standard Deviations for Marijuana Users Only by Gender

	<u>Female</u>		<u>Male</u>		t	df
	Mean	SD	Mean	SD		
Peak Quantity Consumed						
In Lifetime	3.45	2.51	5.07	2.90	-5.74**	305
Peak Quantity Consumed						
In Past Six Months	2.64	2.12	3.75	2.72	-4.34**	284
Peak Quantity Consumed						
In Past 30 Days	2.31	2.23	3.56	3.03	-4.47**	272
Marijuana Related Problems	.18	.72	.23	1.09	-4.17**	251
Enhancement Motives	2.77	1.31	3.22	1.24	-3.38**	395
Social Motives	1.93	.94	2.09	.97	-1.65†	396
Coping Motives	1.86	1.04	1.91	.95	-.60	394
Conformity Motives	1.44	.68	1.36	.53	1.26	387
Expansion Motives	1.38	.71	1.76	.98	-4.13**	268
Impulsive Sensation Seeking						
(ImpSS)	1.53	.24	1.43	.19	4.34**	381
Relaxation and Tension						
Reduction Expectancies						
(RTR)	3.54	.80	3.52	.69	.35	396
Social and Sexual Facilitation						
Expectancies (SSF)	3.08	.66	3.12	.60	-.58	396
Perceptual and Cognitive						
Enhancement Expectancies						
(PCE)	3.08	.73	3.15	.69	-.96	396
Perceived Peer Marijuana Use						
(PPMU)	2.78	.93	3.04	1.00	-2.56*	391
Neuroticism	2.93	.72	2.64	.82	3.64**	308
Extraversion	3.66	.64	3.49	.55	2.78**	394
Openness to Experience	3.11	.57	3.13	.56	-.40	393
Agreeableness	3.45	.61	3.26	.58	3.00**	394
Conscientiousness	3.33	.67	3.27	.59	1.02	366
Brief Symptom Inventory						
Composite (BSITOT)	1.46	.53	1.52	.58	-1.04	320

Note. †: $p < .10$; * $p < .05$; ** $p < .01$; $N = 398$

correlation with Impulsive Sensation Seeking. Marijuana problems were also positively

correlated with Neuroticism and inversely correlated with Agreeableness and

Conscientiousness. A composite of psychopathology symptoms as measured by the Brief

Symptom Inventory (BSITOT) was positively correlated with problems associated with marijuana use.

Enhancement, Social, Coping and Expansion motives were all highly correlated with the marijuana expectancies of Relaxation and Tension Reduction, Social and Sexual Facilitation, and Perceptual and Cognitive Enhancement. These four motives were also all positively correlated with Perceived Peer Marijuana Use and negatively correlated with Impulsive Sensation Seeking. Social, Coping, and Expansion Motives were also positively correlated with BSITOT. Coping Motives were positively correlated with Neuroticism and negatively correlated with Agreeableness. Expansion Motives were positively correlated with Openness to Experience.

Conformity Motives correlated with affect and personality variables slightly differently than the other four motives. It was negatively correlated with Relaxation and Tension Reduction expectancies and positively correlated with Social and Sexual Facilitation expectancies. Conformity Motives did not evidence any significant correlations with Perceptual and Cognitive Enhancement Expectancies, Impulsive Sensation Seeking, or Perceived Peer Marijuana Use. However, Conformity Motives did correlate significantly with Neuroticism, Conscientiousness, and symptoms of psychopathology.

Table 5 provides intercorrelations among the exogenous predictors. All three marijuana expectancies (Relaxation and Tension Reduction, Social and Sexual Facilitation, and Perceptual and Cognitive Enhancement) were highly positively correlated with each other. They were also all positively correlated with Perceived Peer

Table 4

Correlations Among All Predictor and Criterion Variables

	Use	Probs	Enh	Soc	Cope	Conf	Exp	ImpSS	RTR	SSF	PCE	PPMU	N	E	O	A	C
BSITot	.05	.23**	.06	.19**	.21**	.22**	.20**										
Use	---	.67**	.51*	.27**	.33**	-.21**	.39**	-.19**	.28**	.17**	.26**	.59**	-.09	.00	.04	-.01	-.02
Problems		---	.39**	.25**	.40**	-.04	.38**	-.26**	.31**	.20**	.34**	.44**	.15**	-.04	.07	-.16**	.12*
Enhance			---	.59**	.42**	-.08	.33**	-.15**	.44**	.33**	.36**	.46**	-.09	.08	.06	-.05	-.03
Social				---	.51**	.20**	.39**	-.16**	.37**	.47**	.38**	.26**	.05	.02	.02	-.07	-.04
Coping					---	.07	.41**	-.12**	.44**	.31**	.42**	.27**	.18**	-.03	-.01	-.15**	-.02
Conform						---	.15**	-.08	-.14**	.10*	-.02	-.06	.22**	.03	.03	-.08	.14**
Expand							---	-.16**	.23**	.17**	.37**	.26**	.07	-.05	.19**	-.07	-.01

Note. * $p < .05$; ** $p < .01$; $N = 398$. RTR = Relaxation and Tension Reduction Expectancies; ImpSS = Impulsive Sensation Seeking; SSF = Social and Sexual Facilitation Expectancies; PPMU = Perceived Peer Marijuana Use; PCE = Perceptual and Cognitive Enhancement Expectancies; N = Neuroticism; E = Extraversion; O = Openness to Experience; A = Agreeableness; C = Conscientiousness.

Marijuana Use. Both Social and Sexual Facilitation expectancies and Perceptual and Cognitive Enhancement expectancies were positively correlated with Neuroticism and symptoms of psychopathology and negatively correlated with Agreeableness. Perceptual and Cognitive Enhancement expectancies were negatively correlated with Impulsive Sensation Seeking and positively correlated with and symptoms of psychopathology. Perceived Peer Marijuana Use was negatively correlated with Agreeableness and Conscientiousness.

In terms of personality variables, Neuroticism was highly positively correlated with and symptoms of psychopathology. Extraversion, Agreeableness, and Conscientiousness were all negatively correlated with and symptoms of psychopathology. Impulsive Sensation Seeking was negatively correlated with Relaxation and Tension Reduction expectancies, Social and Sexual Facilitation expectancies, and Perceived Peer Marijuana Use. It was positively correlated with Perceptual and Cognitive Enhancement expectancies.

Table 5

Intercorrelations Among Exogenous Predictors of Marijuana Use

	RTR	SSF	PCE	N	E	O	A	C	ImpSS	PPMU	BSITot
RTR	---	.52**	.71**	.06	.05	.03	-.04	.00	-.16**	.23**	.07
SSF		---	.60**	.12*	-.02	-.10*	-.16**	-.05	-.14**	.14**	.09
PCE			---	.20**	-.05	.09	-.13**	-.05	-.22**	.18**	.19**
N				---	-.20**	.03	-.31**	-.18**	-.00	-.03	.42**
E					---	-.07	.24**	.11*	-.13**	.07	-.16**
O						---	.05	-.15**	-.19**	.03	.07
A							---	.21**	.17**	-.10*	-.27**
C								---	.25**	-.13**	-.22**
ImpSS									---	-.24**	-.15**
PPMU										---	.07

Note. * $p < .05$; ** $p < .01$; $N = 398$. RTR = Relaxation and Tension Reduction Expectancies; BSITOT = Brief Symptom Inventory Total Score; ImpSS = Impulsive Sensation Seeking; SSF = Social and Sexual Facilitation Expectancies; PPMU = Perceived Peer Marijuana Use; PCE = Perceptual and Cognitive Enhancement Expectancies; N = Neuroticism; E = Extraversion; O = Openness to Experience; A = Agreeableness; C = Conscientiousness

Tests of Path Models

First, path models were created that attempted to replicate Simons et al.'s (2005) recent study that included affective and motivational variables. Next, study hypotheses 1-6 were evaluated through a series of path models. Initial and final path models, as well as revised path models, will be presented and the observed relationships among variables will be described.

Replication of Simons et al. (2005) study

Simons et al. published a new study in 2005 in which they examined how enhancement and coping motives for marijuana use mediated the relationship between marijuana use and problems and various affective variables such as positive and negative affect, sensation seeking, mood lability, negative mood regulation expectancies, and impulsivity. Their study also examined the relationship between these affective variables and alcohol motives, use and problems. Since Simons et al.'s (2005) research examined mediational relationships that are similar to those proposed in the current study (e.g. sensation seeking, impulsivity, positive and negative affect), their structural model was replicated using data from the current study. Although the exogenous variables proposed in the current study were not identical to the exogenous variables proposed in the Simons et al study (2005), a number of similar constructs were represented. Positive Affect, included by Simons et al, is a component of the NEO-FFI Extraversion construct included in the present study. Simons et al included Sensation Seeking and the current study contained a measure of Impulsive Sensation Seeking. Simons et al measured Negative Affect, while the current study had a broader measure of psychopathology (i.e. the total BSI score). The construct of Neuroticism included in the current study is similar

to the construct of emotional lability included in the Simons et al study. Negative Mood Regulation in Simons et al roughly corresponds to Relaxation and Tension Reduction expectancies.

An initial path model tested Simons et al's (2005) original hypotheses regarding how various affective variables would be indirectly associated with marijuana use through motives. This initial path model is depicted in Figure 2. Similar to the current study's hypotheses, Simons et al. (2005) hypothesized that Neuroticism and symptoms of psychopathology would be positively associated with coping motives and that Relaxation and Tension Reduction expectancies would be negatively associated with Coping Motives. They also hypothesized that Extraversion and Impulsive Sensation Seeking would be positively associated with Enhancement motives. Coping and Enhancement motives were expected to be directly associated with marijuana use and indirectly associated with marijuana related problems through use. Last, as with the current study, Simons et al. hypothesized that Coping motives would be directly associated with marijuana related problems. Last, as with the current study, Coping motives were expected to be directly associated with marijuana related problems.

To re-test the model created by Simons et al., a series of path models were created and tested using EQS software (Bentler, 1995). First, the original, hypothesized model was tested. Then, we added non-hypothesized direct paths that were suggested by the multivariate LaGrange multiplier test from the previous model. Third, we added any non-hypothesized indirect paths that were suggested by the LaGrange test from the second model. In the last step, all non-significant paths were removed from the final model. The overall fit of the initial path model was fair (see Table 6), as both indices of

fit fell below the 0.90 standard. Based upon examination of the results of the multivariate LaGrange multiplier test from the first model, the initial path model was adjusted.

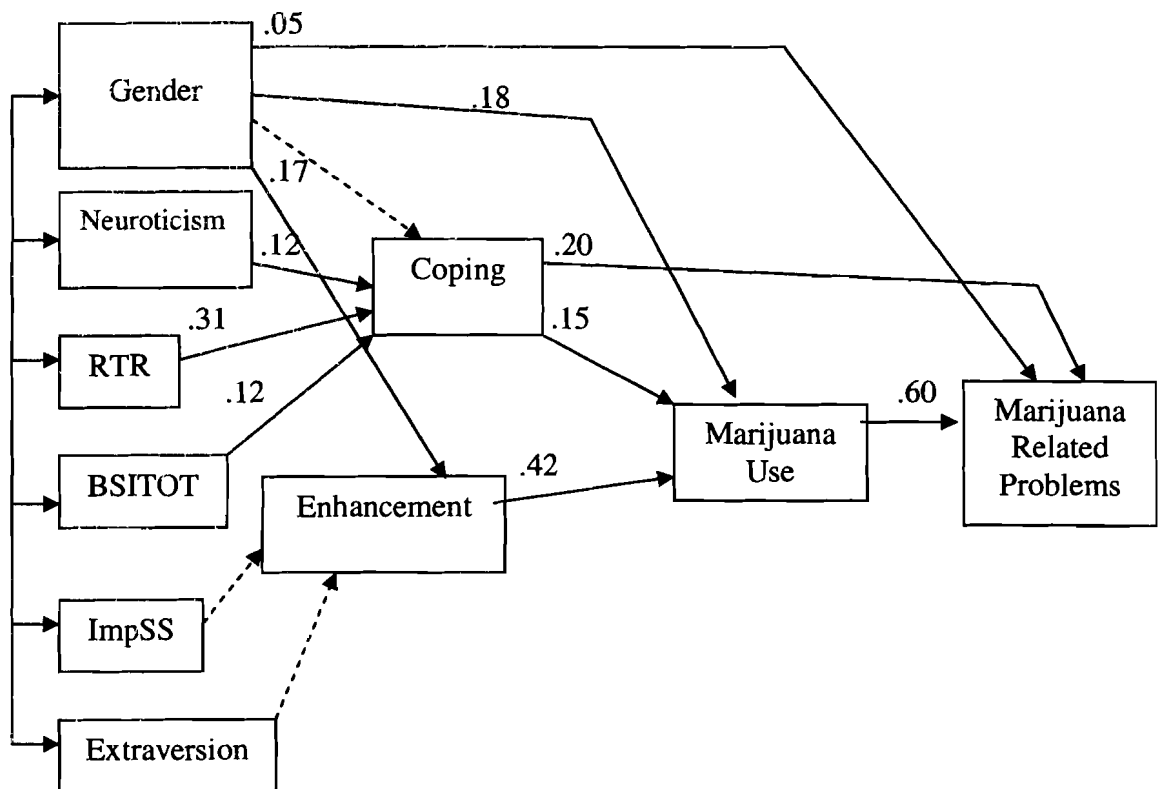


Figure 2. Initial Replication of the Path Model Proposed by Simons et al. (2005). Note. $N = 398$. Standardized path coefficients are shown. Solid lines indicate proposed paths that were found to be significant, dotted lines indicate proposed paths that were non-significant. $NFI = .84$, $CFI = .85$, $\chi^2 = 141.49$, $df = 16$. RTR = Relaxation and Tension Reduction expectancies; BSITOT = Brief Symptom Inventory Composite; ImpSS = Impulsive Sensation Seeking.

In the second model, non-hypothesized direct paths were added from Neuroticism to marijuana problems and from Impulsive Sensation Seeking to marijuana problems. The resulting revised model was found to have improved fit over the initial model, but still did not meet the 0.90 criteria (see Table 6).

Table 6

Model Fit Indices for Replication of Simons et al. study

Model	χ^2	df	χ^2 Change	df for change	NFI	CFI	R ² Marijuana Use	R ² Marijuana Problems
Model 1 (See Figure 2)	141.49	16	---	---	.84	.85	.30	.48
Model 2	101.89	14	39.60*	2	.89	.90	.30	.53
Model 3	17.51	13	84.38*	1	.98	.99	.31	.55
Model 4 (See Figure 3)	25.21	17	7.70	4	.97	.99	.31	.54

Note: $N = 398$. Model 1 = Hypothesized Paths; Model 2 = Adding non-hypothesized direct paths to marijuana use and marijuana problems based on multivariate LaGrange Multiplier test; Model 3 = Adding non-hypothesized indirect paths based on multivariate LaGrange Multiplier test; Model 4 = Deleting non-significant paths. For tests of significance of χ^2 Change, *: $p < .05$.

In the third model, an indirect path was added from Relaxation and Tension Reduction expectancies to Enhancement motives. Model three resulted in significant improvements in model fit (see Table 6), and model fit reached .90.

In the final model (see Figure 3), all non-significant paths were dropped. The paths that were dropped included paths from Neuroticism to marijuana problems, from Impulsive Sensation Seeking to Enhancement motives, from Extraversion to Enhancement motives, from Gender to Coping motives, and from Gender to problems. In this final model, fit was excellent (see Table 6). Overall, the final model explained 31 percent of the variance in marijuana use and 54 percent of the variance in marijuana related problems. Despite the excellent fit of the final replicated model, the model created using the current data set did not work out in the same way that Simons et al. proposed.

The Simons et al. (2005) study differed from the present study in that the present study included more personality constructs whereas the Simons et al. study solely focused on affective variables. In addition, the Simon et al study examined only two of the five motives for marijuana use; Coping motives and Enhancement motives. The present study examined all five motives for marijuana use and their ability to mediate relationships between personality and affective variables and marijuana use and marijuana-related problems. Although the original hypotheses in the current study were not identical to the hypotheses in the Simons et al. (2005) study, the publication of their similar structural model lends credence to the theoretically-based hypotheses proposed in the present study.

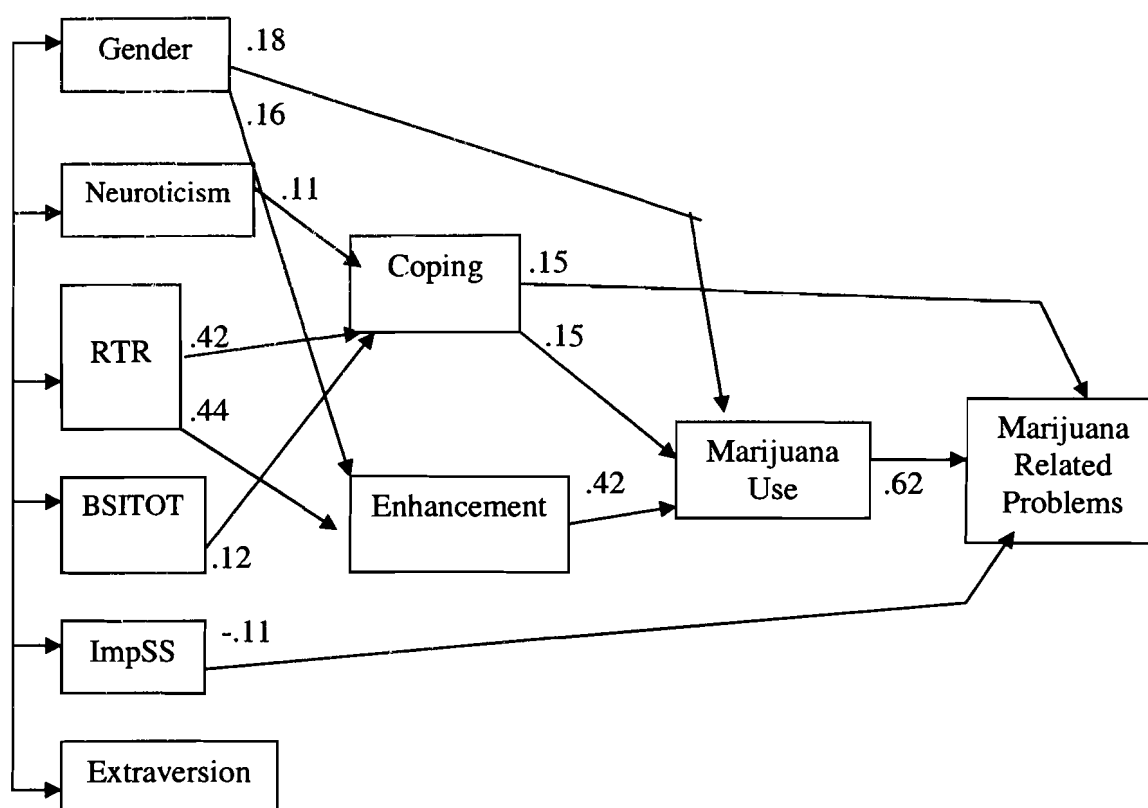


Figure 3. Final Replication of the Path Model Proposed by Simons et al. (2005). Note. $N = 398$. Standardized path coefficients are shown. Solid lines indicate proposed paths that were found to be significant, dotted lines indicate proposed paths that were non-significant. $NFI = .97$, $CFI = .99$, $\chi^2 = 25.21$, $df = 16$. RTR = Relaxation and Tension Reduction expectancies; BSITOT = Brief Symptom Inventory Composite; ImpSS = Impulsive Sensation Seeking.

Initial Path Model for the Present Study

An initial path model tested the original hypotheses regarding how various exogenous variables would affect marijuana use and problems through individuals' motives for use. This initial path model is depicted in Figure 4. Hypothesis 1 was that Coping motives for marijuana use would directly predict the number of problems associated with marijuana use. Hypothesis 2 stated that Enhancement motives would mediate the relationship between Impulsive Sensation Seeking and marijuana use and

between Extraversion and marijuana use. Hypothesis 3 was that depression and anxiety (as measured by the Brief Symptom Inventory), Neuroticism, and Relaxation and Tension Reduction expectancies would predict marijuana use via Coping motives. Hypothesis 4 was that Expansion motives would mediate the relationship between Openness to Experience and marijuana use and between Perceptual and Cognitive Enhancement expectancies (PCE) and marijuana use. Hypothesis 5 stated that Social motives would mediate the relationship between Perceived Peer Marijuana Use and marijuana use and between Social and Sexual Facilitation expectancies and marijuana use. Hypothesis 6 stated that Agreeableness and Conscientiousness would predict marijuana use via Conformity motives. Since gender was correlated with most of the exogenous and endogenous variables in the model, paths were included from gender to each of the proposed mediators in the model (i.e., Coping motives, Enhancement motives, Social motives, Expansion motives, and Conformity motives).

Prior to running the statistical analyses, and in order to make maximum use of the data and view non-hypothesized paths, the following strategy was implemented. To test the model, a series of path models were created and tested using EQS software (Bentler, 1995). Following the procedure used by Cooper et al. (1995) and Read et al. (2003), covariances were estimated among all exogenous variables and among error terms for the motives measures. Model fit was examined using the Normed Fit Index (NFI) and the Comparative Fit Index (CFI) (Bentler & Bonett, 1980). Hoyle and Panter (1995) suggested using multiple fit indices to evaluate adequacy of model fit, designating that fit index values above .9 indicate adequate fit for a particular model. The χ^2 -change statistic was also examined for model comparison. Modifications to the initial model (models

testing hypothesized pathways and models including additional pathways) were made based on examination of LaGrange multiplier tests and residuals. The overall fit of the initial path model was fair (see Table 7), but both indices of fit fell below the 0.90 standard. Based upon examination of the results of the multivariate LaGrange multiplier test from the first model, the initial path model was adjusted (see Figure 5).

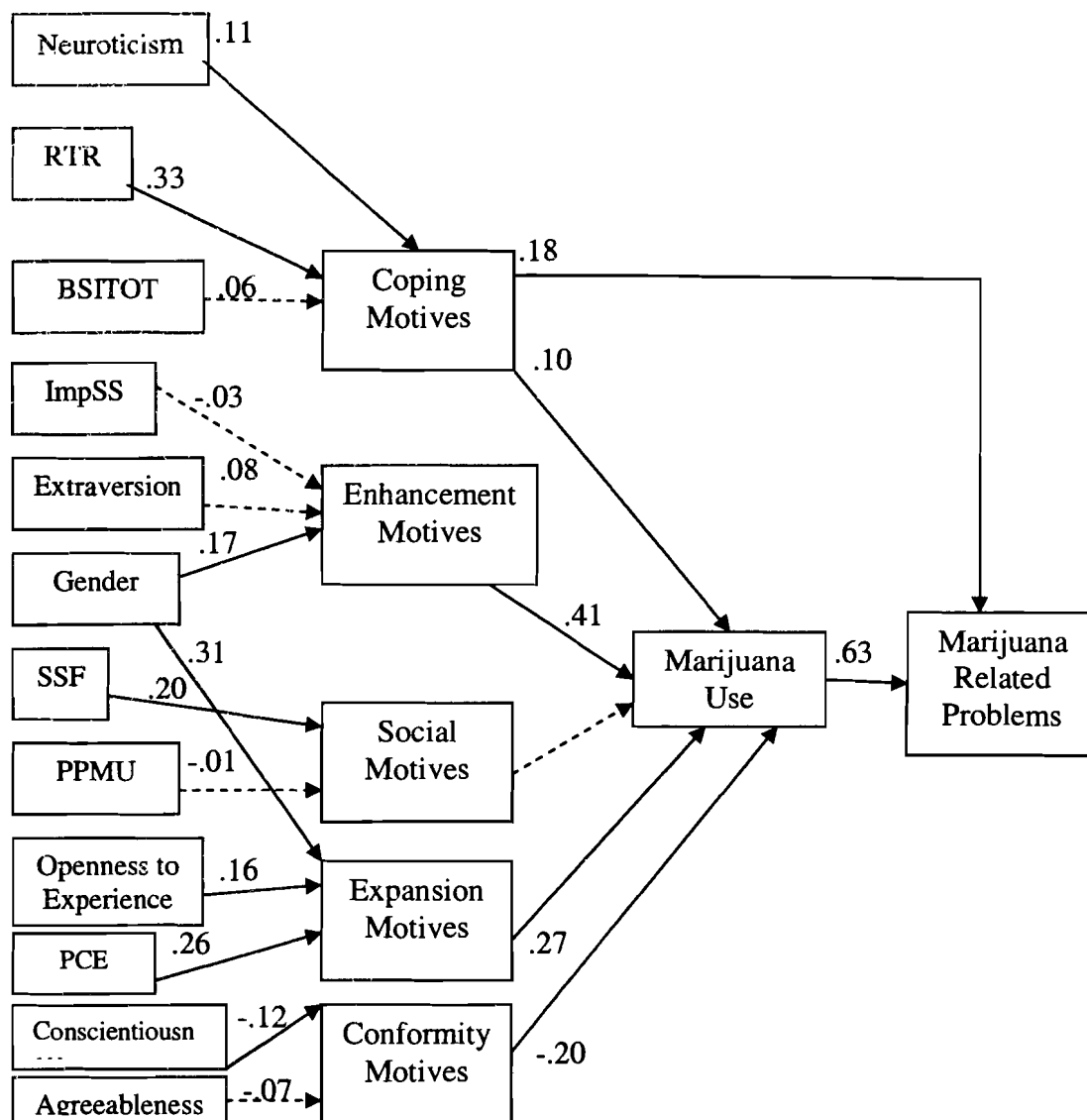


Figure 4. Initial Path Model (Model 1) for Marijuana User Sample. Note. Standardized path coefficients are shown. Solid lines indicate proposed paths that were found to be significant, dotted lines indicate proposed paths that were non-significant. Non-significant paths from Gender are not shown because paths were predicted to each of the proposed mediators in the model (i.e., Coping motives, Social motives, Conformity motives). $N = 398$. $NFI = .82$, $CFI = .84$, $\chi^2 = 422.53$, $df = 73$.

Revised Path Models

In the second model, non-hypothesized direct paths were added from Neuroticism to marijuana problems, from Impulsive Sensation Seeking to marijuana problems, and from Perceived Peer Marijuana Use to marijuana use. In addition, in this step the Lagrange multiplier test also included a direct path for gender. Therefore, a direct path was included from gender to marijuana use. The aforementioned changes were performed on the model and analyses were repeated. Figure 5 depicts this revised model with path estimates included. The resulting revised model was found to have improved fit over the initial model, but still did not meet the 0.9 criteria proposed by Hoyle and Panter (1995) ($NFI = .88$, $CFI = .90$, $\chi^2 = 290.23$, $df = 69$). Therefore, a third model was examined.

The third model (see Figure 6) used results from the second model multivariate Lagrange multiplier test to suggest additional non-hypothesized indirect paths. Paths were added from Relaxation and Tension Reduction to Enhancement motives, from Perceived Peer Marijuana Use to Enhancement motives, from Neuroticism to Conformity, from Social and Sexual Facilitation expectancies to Enhancement motives, and from Perceptual and Cognitive Enhancement to Coping motives. In addition, Model 3 called for indirect paths to be added from the Brief Symptom Inventory composite (BSITOT) to both Social and Conformity motives. Model three resulted in significant improvements in model fit (see Table 7), and model fit reached .90.

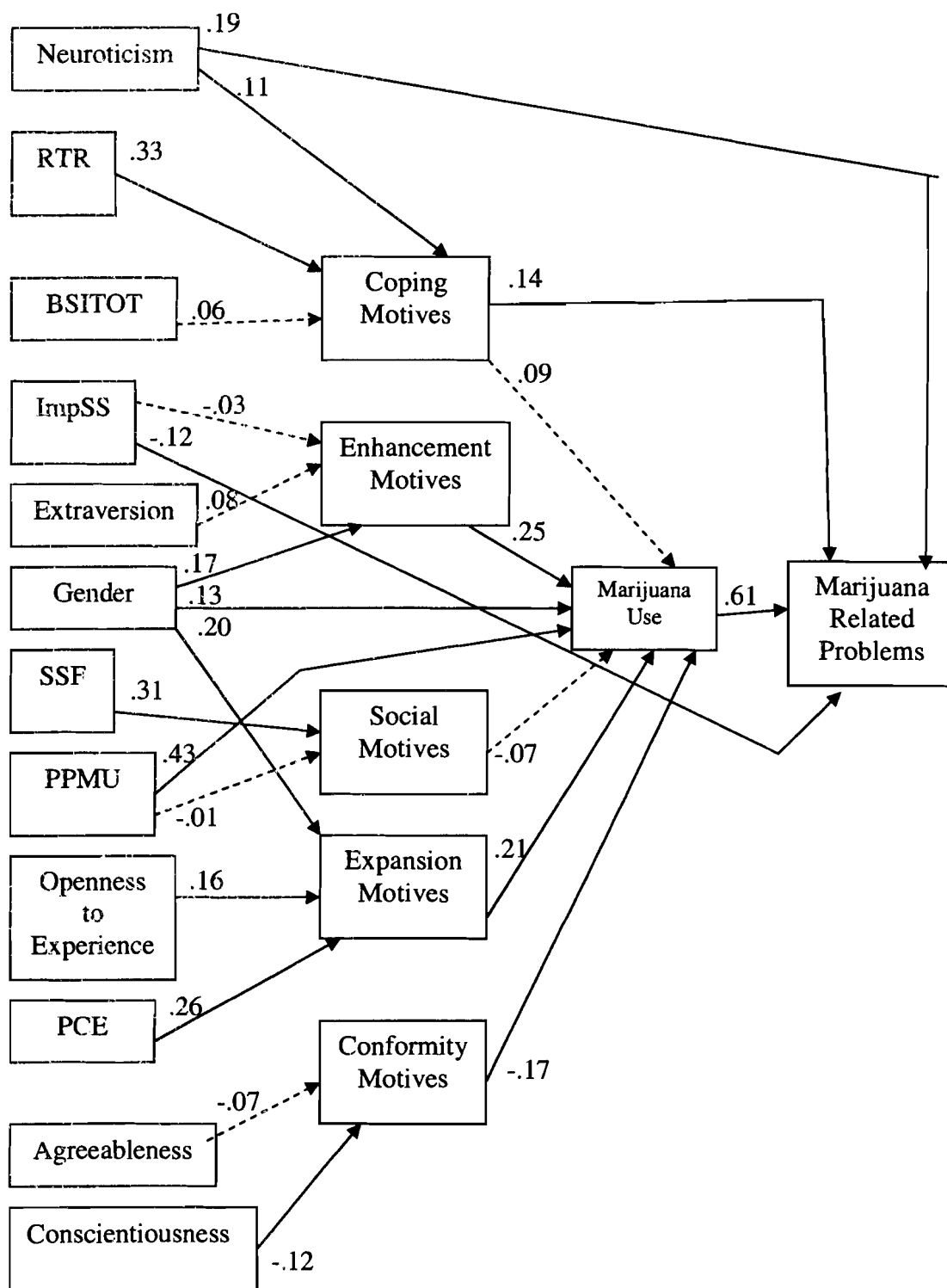


Figure 5. Model 2 Adding Direct Paths to Marijuana Use and Marijuana Related Problems. Note. NFI = .88, CFI = .90, $\chi^2 = 290.23$, $df = 69$.

Table 7

Model Fit Indices for Marijuana User Sample

Model	χ^2	df	χ^2 Change	df for change	NFI	CFI	R ² Marijuana Use	R ² Marijuana Problems
Model 1 (See Figure 4)	422.53	73	---	---	.82	.84	.36	.49
Model 2 (See Figure 5)	290.23	69	132.30*	4	.88	.90	.44	.51
Model 3 (See Figure 6)	145.97	62	144.26*	7	.94	.96	.47	.53
Model 4 (See Figure 7)	156.18	70	10.21	8	.93	.96	.46	.53
Model 4a (See Figure 8)	161.86	72	5.68*	2	.93	.96	.46	.52

Note: $N = 398$. Model 1 = Hypothesized Paths; Model 2 = Adding non-hypothesized direct paths to marijuana use and marijuana problems based on multivariate LaGrange Multiplier test; Model 3 = Adding non-hypothesized indirect paths based on multivariate LaGrange Multiplier test; Model 4 = Deleting non-significant paths; Model 4a = Deleting two more non-significant paths. For tests of significance of χ^2 Change, *: $p < .05$.

In the third model, neither Neuroticism nor BSITOT significantly predicted Coping motives for marijuana use. However, these paths were among the more significant findings in previous alcohol motives research and thus were maintained in the present model. In addition, the relationships between Neuroticism, BSITOT and Coping motives were marginally significant at the .10 level. Due to the fact that BSITOT and Neuroticism are highly correlated with each other ($r = .43$), multicollinearity between these two variables was likely. Therefore, a model was run that removed the path from Neuroticism to Coping motives. When this occurred, BSITOT became a significant predictor of Coping motives. In addition, after removing the path from BSITOT to Coping motives, Neuroticism became a significant predictor of Coping motives. When paths from BSITOT to Coping motives and Neuroticism to Coping motives were dropped, the fit of the model was hurt significantly (χ^2 Change = 22.10, df change = 10). Therefore, both the path from Neuroticism to Coping motives and the path from BSITOT to Coping motives were maintained in Model 4.

In the fourth model (see Figure 7), all non-significant paths were dropped except the path from BSITOT to Coping motives and from Neuroticism to Coping Motives. The paths that were dropped included paths between Gender and Coping motives, Impulsive Sensation Seeking and Enhancement motives, Extraversion and Enhancement motives, Gender and Social motives, and Social motives and Marijuana Use. In addition, paths between Gender, Agreeableness, and Conscientiousness and Conformity motives were dropped. After dropping these paths, there were still two non-significant paths remaining in the model including paths were from Neuroticism to Coping motives and from Coping motives to marijuana use. Therefore, in Model 4a (the final model), these last two non-

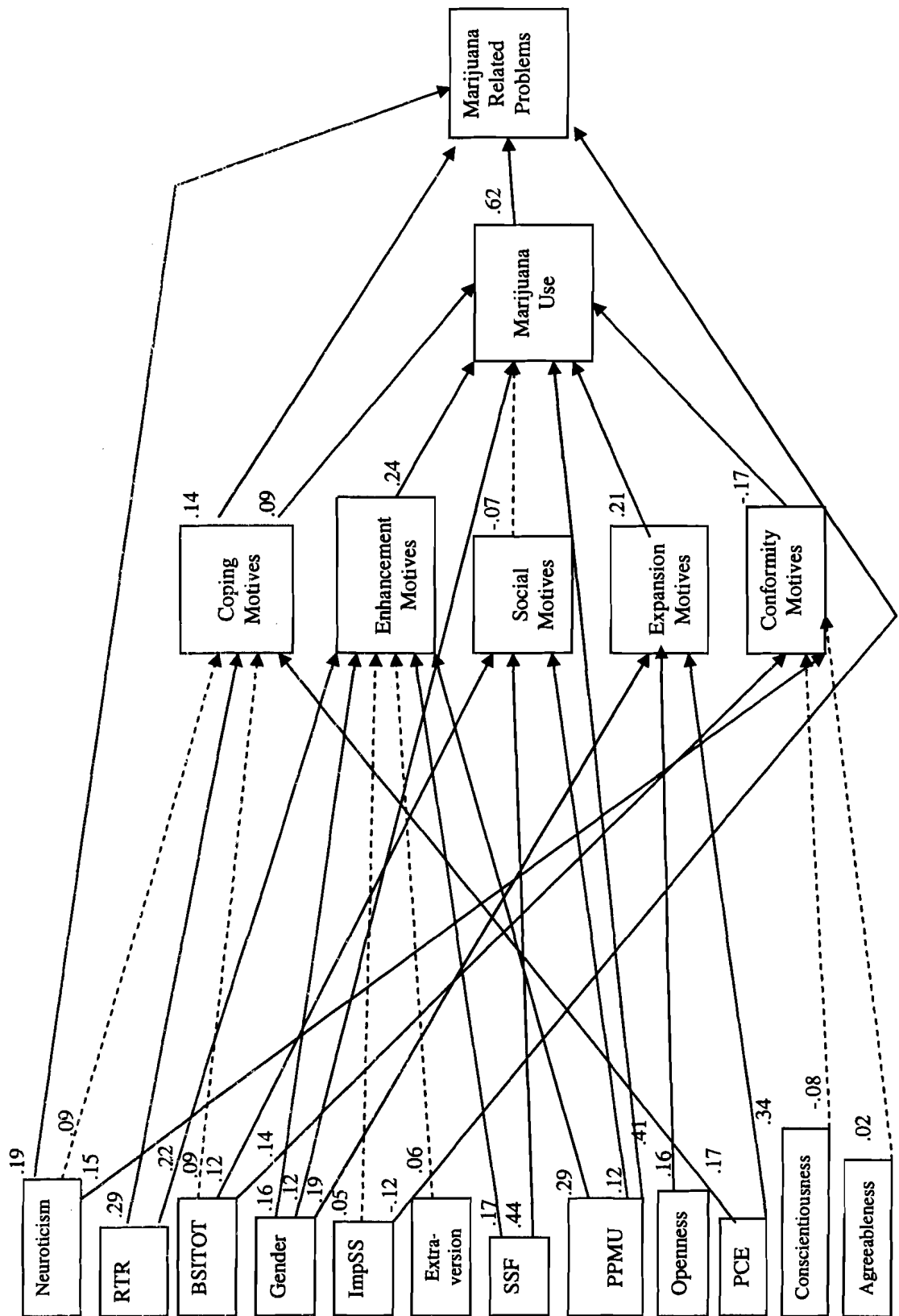


Figure 6. Model 3 adding Non-hypothesized Indirect Paths. Note. NFI = .94, CFI = .96, $\chi^2 = 145.97$, $df = 62$.

significant paths were dropped (see Figure 8). These paths were from Neuroticism to Coping motives and from Coping motives to Marijuana Use.

The final model demonstrates the significant complexity in the relationship between various personality and affective variables and marijuana use and marijuana related problems. In this final model, fit was excellent (see Table 7). Overall, the final model explained 46 percent of the variance in marijuana use and 52 percent of the variance in marijuana related problems.

As hypothesized (hypothesis 1), Coping motives for marijuana use directly predicted marijuana related problems. However, contrary to hypothesis 2, Impulsive Sensation Seeking was not directly related to Enhancement motives, nor did Enhancement mediate the relationship between Extraversion and marijuana use. Hypothesis 3 was only partially borne out in the final model. BSITOT and Relaxation and Tension Reduction Expectancies (RTR) were found to predict Coping motives. However, Neuroticism was not found to be significantly correlated with Coping motives. In addition, Coping motives did not mediate the relationships between BSITOT and RTR and marijuana use. In fact, in this sample there was no significant relationship between Coping motives and marijuana use. As hypothesized (hypothesis 4), Expansion motives mediated the relationship between both Openness to Experience and Perceptual and Cognitive Enhancement and marijuana use. However, contrary to hypothesis 5, Social motives did not mediate the relationship between Perceived Peer Marijuana Use and Social and Sexual Facilitation and marijuana use. The two exogenous variables of Perceived Peer Marijuana Use and Social and Sexual Facilitation expectancies were significantly related to Social Motives, but Social Motives did not predict marijuana use.

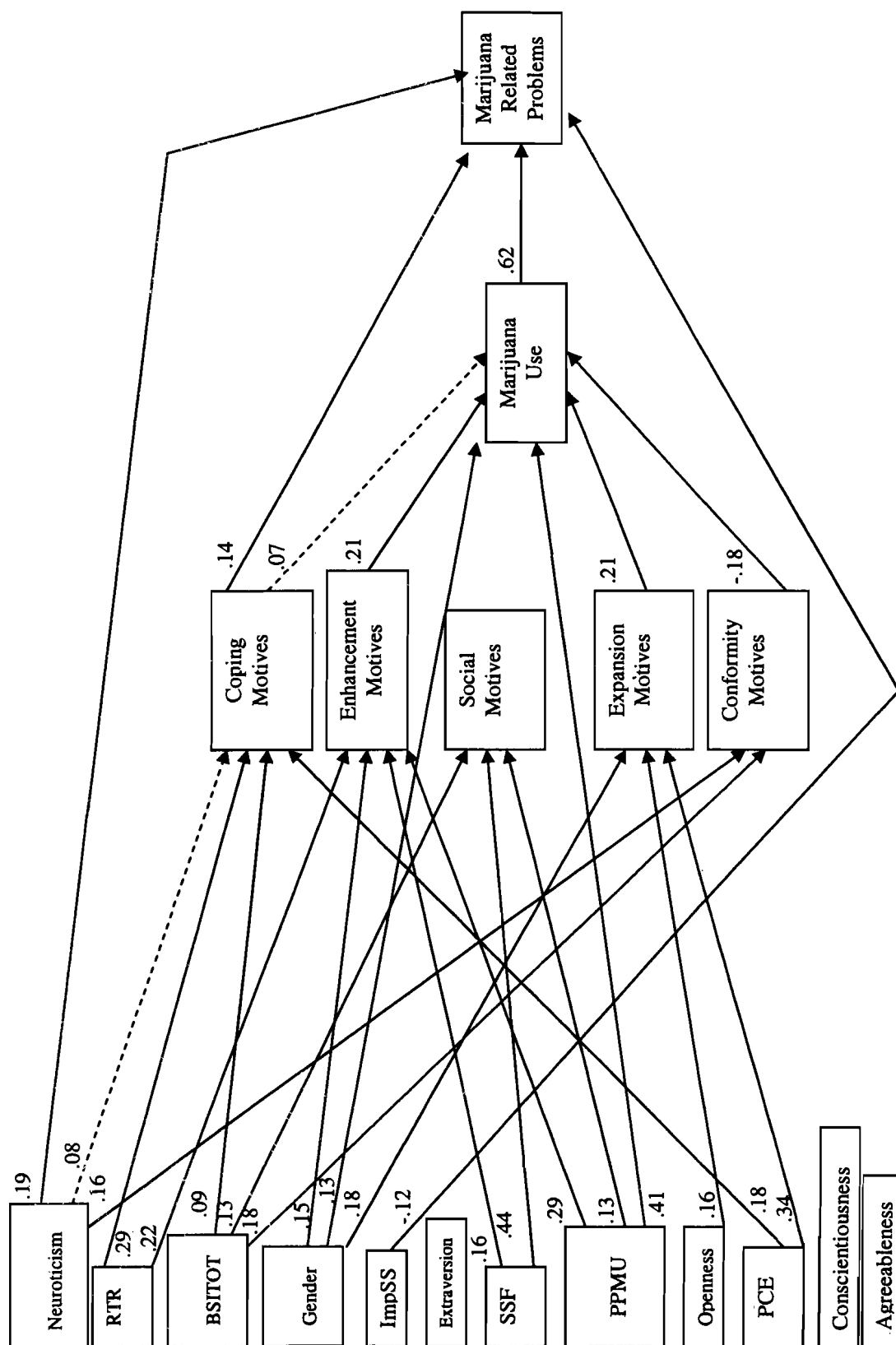


Figure 7. Model 4 Deleting Nonsignificant Paths. Note. NFI = .93, CFI = .96, $\chi^2 = 156.18$, $df = 70$.

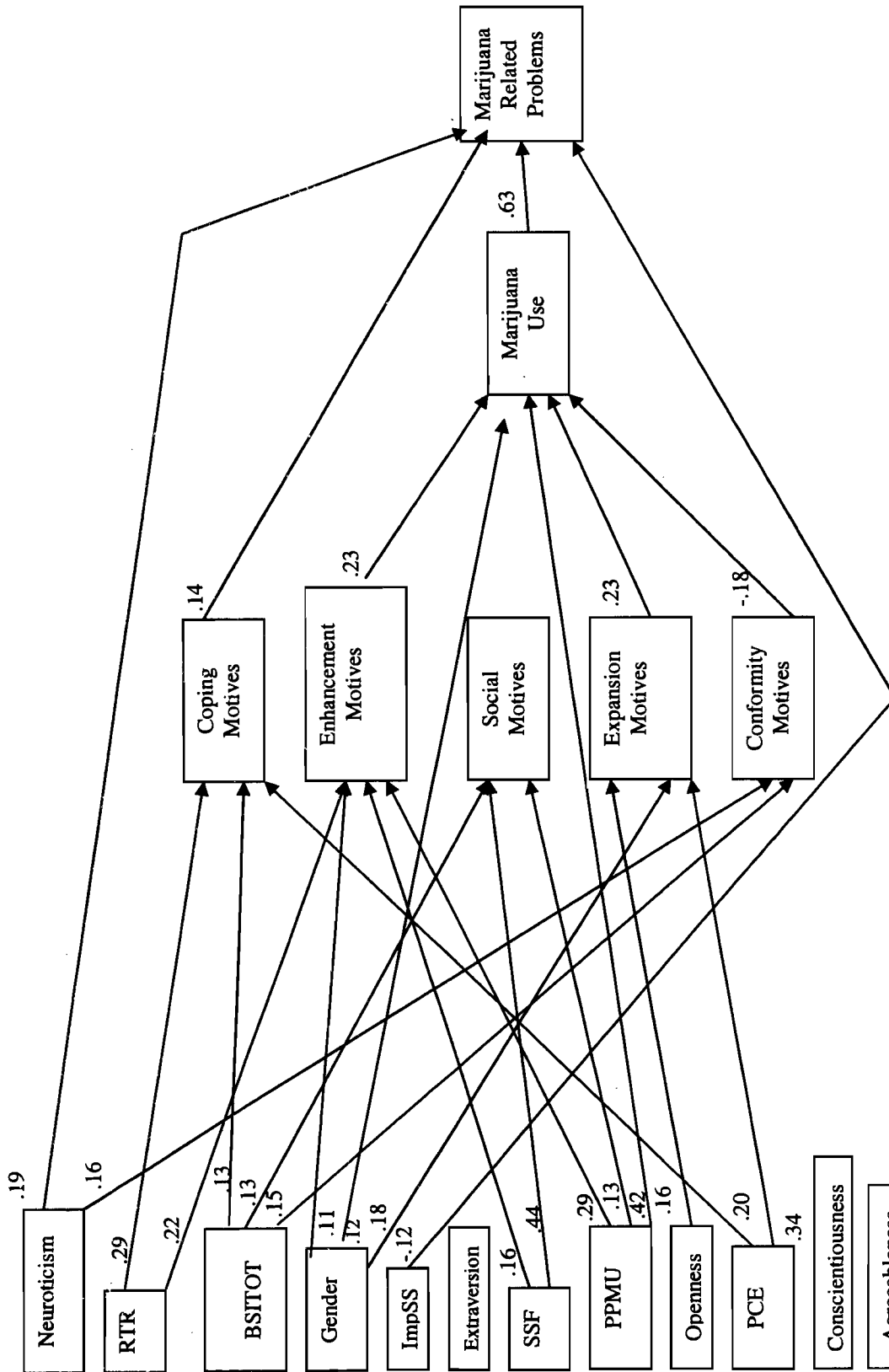


Figure 8. Model 4a Deleting Two More Nonsignificant Paths (Final Path Model). Note. All standardized paths shown in the final model are significant at the .05 level. NFI = .93, CFI = .96, $\chi^2 = 161.86$, $df = 72$.

Hypothesis 6 was not confirmed. Agreeableness and Conscientiousness were dropped out of the model due to non-significance. However, Conformity motives did negatively predict marijuana use. The following sections provide further descriptions of the pathways found in the final model.

Positive and negative affect (as measured by BSITOT) were related to marijuana use indirectly via Enhancement and Conformity motives. Also, as hypothesized, BSITOT was related to Coping motives. In addition, the present study also found a path from both Perceived Peer Marijuana Use and Social and Sexual Facilitation expectancies to Enhancement Motives, which were unanticipated results. Additionally, Perceived Peer Marijuana Use was directly related to marijuana use. Other non-hypothesized results include a direct relationship between Perceptual and Cognitive Enhancement expectancies and Coping Motives. Unexpectedly, Impulsive Sensation Seeking was found to have a negative association with marijuana related problems. Interestingly, Neuroticism was found to have direct paths both to Conformity Motives and to marijuana related problems. Gender was found to have significant relationships to Enhancement Motives, Expansion Motives, and marijuana use. However, in the final model Gender was not significantly related to Coping Motives, Social Motives, or Conformity Motives. Finally, as expected based on previous research, marijuana use and marijuana related problems were highly correlated.

In summary, the final path model provided a good fit to the data in the present study. Hypotheses 1 and 4 were supported, and hypotheses 3 and 5 were partially supported. Hypotheses 2 and 6 were not supported. Overall, the final path model provides substantial support for the notion that variables related to an individual's

personality and affective state influence overall marijuana use and marijuana related problems via various motives for marijuana use. The final model also suggests that Perceived Peer Marijuana Use, Gender, and Neuroticism impact marijuana outcomes directly as well as through alternate mediational pathways. Overall, results are similar to previous research regarding how motives for alcohol use mediate the relationship between various personality and affective characteristics and alcohol consumption. In the final model, some of the expected relationships between mediating variables and subsequent marijuana outcomes were not found; however, a number of additional, non-hypothesized pathways were added to the model.

Chapter 4

DISCUSSION

Discussion of the present study begins with a brief summary of key findings. Hypotheses that were and were not supported as well as additional findings will be discussed. Next, the relationship between various personality and affective variables and marijuana use and problems is considered. Then, discussion focuses on the theoretical and practical implications of the current findings. Limitations of the present study and future directions for research in this area conclude the discussion section.

Summary of Findings

The present study sought to replicate and extend the work of Simons et al. (2000, 2005) by examining the role of motives for marijuana use as they relate to various affective and personality variables and to marijuana use and marijuana related problems in a college student sample. The present study provides support for the notion that some motives for using marijuana mediate the relationship between several affective and personality variables and marijuana use and marijuana-related problems. As hypothesized (hypothesis 1), Coping motives for marijuana use directly predicted marijuana related problems. However, Impulsive Sensation Seeking was not directly related to Enhancement motives (primary hypothesis 2), nor did Enhancement mediate the relationship between Extraversion and marijuana use. Symptoms of psychopathology

and Relaxation and Tension Reduction Expectancies (RTR) were found to predict Coping motives. However, Neuroticism was not found to be significantly correlated with Coping motives. In addition, Coping motives did not mediate the relationships between symptoms of psychopathology and Relaxation and Tension Reduction expectancies and marijuana use. Coping motives were not related to marijuana use in this sample. As hypothesized (hypothesis 4), Expansion motives mediated the relationship between both Openness to Experience and Perceptual and Cognitive Enhancement and marijuana use. However, Social motives did not mediate the relationship between Perceived Peer Marijuana Use and marijuana use or between Social and Sexual Facilitation and marijuana use (primary hypothesis 5). The two exogenous variables of Perceived Peer Marijuana Use and Social and Sexual Facilitation expectancies were significantly related to Social Motives, but Social Motives did not predict marijuana use. Hypothesis 6 was not confirmed. However, Conformity motives did negatively predict marijuana use.

Overall, the final path model provides substantial support for the notion that variables related to an individual's personality and affective state influences overall marijuana use and marijuana related problems via various motives for marijuana use. The final model also suggests that Perceived Peer Marijuana Use, Gender, and Neuroticism impact marijuana outcomes directly as well as through alternate mediational pathways. On the whole, the present study demonstrates the complexity involved in predicting marijuana use and marijuana-related problems.

The complexity of the model was enhanced by the fact that several non-hypothesized paths occurred in the final path model. Several significant relationships occurred among the exogenous and mediating variables. In addition, several exogenous

variables were found to be directly related to marijuana use and marijuana related problems. Although no hypotheses had been made regarding how gender would relate to both motives for marijuana use and marijuana use and problems, gender was found to have several relationships to both the mediating and the outcome variables.

Replication of the Simons et al. (2005) Study

The final replicated path model that emerged from the present data was somewhat different from the model that Simons et al. proposed. However, these differences might be partially explained by the differences in the focus between the two studies. The present study included more personality constructs whereas the Simons et al. study focused solely on affect regulation. Personality constructs are more trait-dependent characteristics and less influenced by environmental or situational factors. On the other hand, affect regulation or dysregulation may be more state-dependent and may fluctuate considerably in response to other factors. In terms of drug use, individuals' motives for using marijuana may differ depending on whether they expect marijuana to cause changes in state-dependent factors such as affect regulation (e.g. decrease negative mood) or cause temporary changes in their personality (e.g. more social, less inhibited).

In addition, the Simons et al. study examined only two of the five motives for marijuana use, Coping motives and Enhancement motives. The present study examined all five motives for marijuana use and their mediational influences between personality, social and affective variables and marijuana use and problems. Also, the participants in the Simons et al. study were individuals who had used marijuana within the past year. In the present study, the requirement was that participants had used marijuana at least once in their lifetimes.

The replication of Simons et al.'s study demonstrated what has been previously found in the alcohol motives research regarding positive and negative affect. The current replication showed that the motivational effect of negative emotions are much more powerful than the effect of positive emotions. Affect regulation models have proven to be more effective for explaining how negative affect influences motives for drug use. Individuals are more motivated to escape from negative emotions than they are motivated to enhance already positive affect. Drinking to cope is conceptualized as a reactive process that is initiated by the experience of negative emotions (Cooper et al., 1995), and underarousal or low levels of positive emotion should elicit drinking to enhance positive affect (Wills & Shiffman, 1985). Therefore, the replication was more consistent with supporting the Coping aspect of marijuana motives. The exogenous variables that were predicted to be related to Enhancement motives were not significantly related (e.g. Impulsive Sensation Seeking and Extraversion). However, the hypothesized paths from Neuroticism, Relaxation and Tension Reduction expectancies and affect dysregulation to Coping were significant.

The hypotheses about Enhancement motives were not borne out well in his model or in the replicated model. This adds further evidence for the necessity of testing a model that goes beyond affect regulation because there appears to be more involved in predicting motives for marijuana use than just affect regulation. Although the original hypotheses in the current study were not identical to the hypotheses in the Simons et al. (2005) study, the publication of their similar structural model lends credence to the theoretically-based hypotheses proposed in the present study.

Motives for Marijuana Use

The present study sought to replicate and extend the work of Simons et al. (2000, 2005) by examining the role of marijuana motives as they related to various affective and personality variables as well as marijuana use and marijuana-related problems in a sample of college students. Similar to previous research (Read et al., 2003; Cooper et al., 1995; Simons et al., 2005), the current study found that the relationships between a majority of the predictor variables and marijuana use and/or marijuana related problems were mediated by Coping, Enhancement, Expansion, and Conformity motives for marijuana use.

Much of the effect of the affective and personality variables in the present study on marijuana use and problems were mediated by motives for marijuana use. Thus, it may be that affect regulation and aspects of one's personality affect marijuana use and problems in both distal and proximal fashions. As the proposed model states, affective and personality variables have a distal effect on marijuana use, while motives for use have a more proximal effect.

Coping Motives

Patterns of results. In adult and adolescent samples, Cooper, Agocha, and Sheldon (2000) and Cooper et al. (1995) found that Coping motives predicted alcohol problems both directly and indirectly via alcohol use. On the other hand, Read et al. (2003) found only direct paths from Coping motives to alcohol related problems in college student samples. In relation to marijuana use, Simons et al. (2005) found that coping motives were in fact a significant predictor of both marijuana use and marijuana related problems. However, Chabrol et al. (2005) found that coping motives were not

linked to marijuana use. The present study found similar results to Chabrol et al. in that only a direct path from Coping motives to marijuana related problems was found in this college student sample.

Cooper et al. (1995) hypothesized that they would find a direct path between Coping motives and alcohol problems because individuals who rely on alcohol use to cope may be alcohol dependent or exercise little personal control over when, where, and/or how much they drink. The same is likely true for any substance, and this hypothesis could easily be extended to marijuana use. Individuals who report high levels of Coping motives for marijuana use may show impaired control over the amount or patterning of their use. Also, individuals who have experienced marijuana-related problems may be overwhelmed and less able to cope. They may be less likely to seek the help and support of others due to embarrassment or legal issues surrounding their marijuana problems. The fact that Coping motives were directly linked to marijuana related problems in the present study suggest that the relationship between Coping motives and alcohol use/problems and between Coping motives and marijuana use/problems is likely very similar.

In addition to differences in the pattern of the paths between Coping motives and alcohol or marijuana related problems, the magnitude of the path from Coping motives to alcohol/marijuana related problems varied significantly across these different studies. In two studies of young adults, one involving a community sample (Cooper et al., 2000) and one involving a college sample (Read et al., 2003) the direct path between Coping motives and alcohol problems was rather small (path coefficients ranging from .06-.10). Larger path coefficients have been found by Cooper et al. (1995) in an adolescent sample

(ages 13-19, path coefficient = .32), Johnson et al. (2005) in a college sample (path coefficients ranging from .24-.25), and Cooper et al. (1995) in an adult sample (.27). Not as many studies using path modeling have been conducted on motives for marijuana use. However, Simons et al. (2005) found a path from Coping motives to marijuana related problems in a college student sample with a path coefficient of .32. On the other hand, the current study had a path coefficient of only .14 in the final expanded model (Figure 8).

Perhaps using to cope may be a more important motive for marijuana use in the Simons et al. (2005) sample than in the current sample. Peer influences are commonly thought to be the most powerful influence on college student drinking (Dimeff et al. 1999), so it is possible that social influences could overwhelm the effects of Coping motives for marijuana use in college student samples. In terms of alcohol use, Read et al. (2003) found that Perceived Peer Drinking Environment overwhelmed the effect of motives for drinking in a longitudinal path model. However, Simons et al. did not investigate Social motives for marijuana use in their study. Therefore, the lower path coefficient in the present study may be due to more of the variance of marijuana related problems being accounted for by motives other than Coping. Also, the present study found a higher path coefficient in the relationship between marijuana use and marijuana-related problems (.63 in the final extended model). This coefficient was .49 in the Simons et al. study. Given this difference, it may be that some of the variance in marijuana-related problems explained by Coping motives in the Simons et al. study was explained by marijuana use in the present study.

It is also possible that the differences between the studies in terms of paths found and the strength of the relationship between coping and marijuana problems are merely functions of methodological differences in the studies. For example, Simons et al. (2005) included only individuals who had used marijuana in the last 12 months in their sample, whereas the present study examined individuals who reported using marijuana at least once in their lifetimes. It may be that individuals who have used marijuana within the last year have different motives or stronger motives for using than individuals who may have tried marijuana one or two times several years ago. The participants in the Simons et al. study may be more heavy marijuana users who have more symptoms of marijuana dependence. Therefore, these individuals may be more likely to use marijuana to cope with the negative effects of marijuana use or to cope with the negative affect that may have led them to use marijuana heavily in the first place. Also, Simons et al. may have found a larger relationship between Coping motives and marijuana-related problems due to the present study including more predictor variables. The increased number of predictor variables may have resulted in any one predictor having a smaller relationship to marijuana use/problems than it did in the Simons et al. study.

Predictors of Coping Motives. The current study also has implications for knowledge of factors that affect Coping motives for marijuana use. Previous studies found that tension reduction expectancies, negative affect, extraversion, and neuroticism all predicted Coping motives for drinking alcohol (Cooper et al., 1995; Cooper et al., 2000; Read et al., 2003; Hussong, 2003). In addition, studies examining marijuana use found that positive and negative affect and negative mood regulation expectancies predicted Coping motives for marijuana use (Wills et al., 1999; Simons et al., 2005). In

the current study, Relaxation and Tension Reduction expectancies, Perceptual and Cognitive Enhancement expectancies and symptoms of psychopathology (BSI total score) predicted Coping motives for marijuana use.

Both the current study and Simons et al. (2005) contribute to the literature with regard to the impact that various aspects of affect and expectancies have on coping motives for marijuana use. Simons et al. (2005) found a significant path between Negative Mood Regulation expectancies and Coping motives for marijuana use in a college student sample. Despite utilizing a slightly different measure and measuring a slightly different expectancy (Relaxation and Tension Reduction vs. Negative Mood Regulation), the current study found a slightly larger sized path between Relaxation and Tension Reduction expectancies and Coping motives for using marijuana in a sample of college students. These results suggest that expectancies are powerful predictors of Coping motives. Cox and Klinger (1988) described motives as derived from outcome expectancies. Therefore, in their model expectancies that a drug will reduce tension are necessary but not sufficient to use marijuana with a motive of tension reduction or coping. The motivational model implies that individuals with high expectancies that marijuana will help them to relax and lift a negative mood may be more likely to use marijuana instead of relying on other coping mechanisms. This could be tested in future studies by measuring coping strategies employed by individuals with different levels of tension reduction expectancies and/or Coping motives for use. It could be that expectancies for tension reduction only lead to coping motives for use in individuals who lack other coping mechanisms (e.g., those who lack coping skills, those who lack social

support). Thus, the relationship between Tension Reduction expectancies and Coping motives for use could be mediated by availability of other coping options.

Unfortunately, the present study did not find that Coping motives mediated the relationship between Relaxation and Tension Reduction expectancies and marijuana use as was predicted. This mediational relationship had been found in the alcohol literature (Cooper et al., 1995; Read et al., 2003). Chabrol et al. (2005) found that Coping motives were not linked to marijuana use. In the present study there was also no significant relationship between Coping motives and marijuana use. Also, Simons et al. (2005) found that coping motives had a substantial direct association with problems. It may be that individuals who use marijuana to cope with negative affect or stress may not necessarily use marijuana in higher quantities, but when they do use marijuana they are using it in a way that leads to more use-related problems such as not fulfilling obligations.

In addition to expectancies, the present study also found that symptoms of psychological distress (BSI total score) also predicted Coping motives for marijuana use, with higher levels of distress predicting higher levels of Coping motives. This positive relationship between negative affect and Coping motives has been substantiated in much of the alcohol literature (Cooper, 1994). Wills et al. (1999) also found this same relationship to exist between negative affect and Coping motives for marijuana use. Simons et al. (2005) had also hypothesized that negative affect would predict Coping motives for marijuana use. However, Simons et al. found that Tension Reduction expectancies predicted Coping motives, while negative affect did not. In the present study, Tension Reduction expectancies did not predict Coping motives, but psychological

distress did. These differences in results may be the result of methodological differences in the two studies. Simons et al. utilized the Negative Mood Regulation Expectancies (NMR) measure to examine expectancies, whereas the present study utilized the Marijuana Expectancy Effects Questionnaire. In addition, Simons et al. used the Positive and Negative Affect Schedule to assess negative affect, whereas the present study used the Brief Symptom Inventory as an assessment of psychological distress.

Based on previous alcohol research suggesting that Coping motives mediated the relationship between Neuroticism and alcohol outcomes (Cooper et al., 2000; Hussong, 2003), the present study hypothesized that Coping motives would also mediate the relationship between Neuroticism and marijuana outcomes. However, in the current study there was no significant path from Neuroticism to Coping motives. Nevertheless, Neuroticism was found to have a direct positive relationship to marijuana related problems. This relationship will be explored upon discussion of marijuana problems.

An interesting, non-hypothesized finding of the current study is that Perceptual and Cognitive Enhancement expectancies predicted Coping motives for marijuana use. One possible explanation for this relationship is that many of the individual questions that fall on the Perceptual and Cognitive Enhancement expectancies subscale tap into an expectation that marijuana helps one to escape negative affect. For instance, questions such as "When I smoke marijuana it helps me escape reality", "Marijuana makes it easier to escape from problems and responsibilities", and "marijuana causes euphoria (strong sense of well-being)" comprise the Perceptual and Cognitive Enhancement subscale. What the authors of the Marijuana Effects Expectancy Questionnaire labeled Perceptual and Cognitive Enhancement expectancies may actually overlap conceptually with coping

or affect regulation types of expectancies. In addition to expanding perceptions and cognitions, this scale has items related to affect. It is likely these affect items that produce the relationship between this scale and coping motives for use.

Enhancement Motives

Patterns of results. Cooper et al. (2000) found both a direct path from Enhancement motives to alcohol related problems, as well as an indirect path from Enhancement motives to alcohol related problems via alcohol use in a college student sample. Overwhelmingly the majority of studies have found a direct path only from Enhancement motives to alcohol consumption (Cooper et al., 1995; Read et al., 2003). The present study found similar results in that a direct path only from Enhancement motives to marijuana use was found in a sample of college students. The magnitude of the path from Enhancement motives to alcohol use varied substantially across these different studies. In addition, the magnitude from Enhancement motives to marijuana use varied between the present study and the Simons et al. (2005). They found a path coefficient of .43 between Enhancement motives and marijuana use, whereas in the final expanded model of the present study (Figure 8) the coefficient was .23. The smaller coefficient in the present study may be the result of methodological issues. The current study had more predictors of use than the Simons et al. study. Also, the sample in the Simons et al. study was comprised only of individuals who had used marijuana in the past year. The present study sample was comprised of students who had used marijuana at some point in their lifetimes. The more recent marijuana use of many of their participants may have resulted in the increased magnitude in the Simons et al. study.

Simons et al. did not examine the relationship between Social motives and marijuana use in their 2005 study. However, Enhancement proved to be a strong predictor of marijuana use in the present study. In this study and in the alcohol literature it was found that the path from Enhancement motives to alcohol/marijuana use was larger than the path from Social motives to use. In fact, some studies (Read et al., 2003) did not find any paths from social motives to use. Thus across age groups, using in order to enhance positive affect (e.g., to get a buzz, to get a pleasant feeling, etc.) generally accounts for more of the variance in use than does using to socialize. Enhancement motives represent using a substance for the direct physiologically reinforcing properties of the substance, while Social motives represent using the substance to obtain social reinforcement. This difference could plausibly explain why Enhancement motives have a stronger impact on alcohol and marijuana use than Social motives. When using a substance to enhance, the amount of reinforcement derived is likely to be more closely tied to the amount of the drug consumed than when using a substance to socialize. One may need to use more marijuana to maintain a "buzz" than to sustain social conversation. However, it is also important to note that there is a large overlap between Enhancement and Social motives, with very high correlations frequently occurring between the two.

Predictors of Enhancement Motives. Previous studies have found that impulsivity/sensation seeking, neuroticism, extraversion, low conscientiousness, and social lubrication/emotional expectancies predict enhancement motives for drinking (Cooper et al., 1995,2000; Read et al., 2003; Hussong, 2003; Stewart and Devine, 2000; Loukas et al., 2000). In examining the relationship between Enhancement motives and predictors of marijuana use, Shafer and Brown hypothesized that perceptual and

cognitive enhancement expectancies may be associated with Enhancement motives for marijuana use. Simons et al. (2000) hypothesized that both positive affect and sensation seeking would be positively related to using marijuana for Enhancement reasons.

However, in their study they found that marijuana Enhancement motives were not significantly predicted by either of these variables. Similarly, in the present study neither impulsive sensation seeking nor extraversion significantly predicted Enhancement motives for marijuana use. Cooper et al. (1994) found that positive affect did not significantly predict Enhancement motives for drinking. It may be similar for marijuana use in that if an individual is already feeling good then they may lack a strong incentive to participate in an activity (i.e. smoking marijuana) that is going to make them feel better.

In the present study, three non-hypothesized paths were found between exogenous variables and Enhancement motives. First, there was a significant relationship found between Relaxation and Tension Reduction expectancies and Enhancement motives. This relationship also exists in previous literature on alcohol motives in college students. Read et al. (2003) also found that Relaxation and Tension Reduction expectancies predicted Enhancement motives for drinking. Individuals who endorsed tension reduction expectancies not only expect that a drug will likely help them escape from unpleasant feelings, they also expect that using that drug will in fact make them feel good. This could explain why, in the current study, relaxation and tension reduction expectancies were related to both Enhancement and Coping motives. Also, a significant path was present from Social and Sexual Facilitation expectancies to Enhancement motives. This result has also been found in the alcohol motives literature. In previous

studies examining motives for drinking in college students, there was often significant overlap between Social and Enhancement motives. Cooper et al. (1995) found that the relationship between social/emotional enhancement expectancies and alcohol use was mediated by Enhancement motives for drinking. It may be that Social and Sexual Facilitation expectancies predicts Enhancement motives as well as Social motives because in social settings individuals are also looking to have fun and be a part of the social scene. For some college students, a large part of the social scene may be sexual activity. College students might expect more positive affect associated with sexual activity. In the current study, this could be reflected by the positive relationship between social/sexual enhancement expectancies and enhancement motives for use.

In the present study, a third non-hypothesized relationship appeared between Perceived Peer Marijuana Use and Enhancement Motives. Both Johnson et al. (2005) and Drerup (2005) found a large path between Perceived Peer Drinking Environment and Enhancement motives for drinking, suggesting that perceptions of peers' drinking is an important predictor of Enhancement motives for drinking in both college students and adults. Expectancies are the basis for motives. Expectancies can develop through personal experience as well as observation of outcomes experienced by others (Bandura, 1986). Relative to students who do not have many friends who use marijuana, those who have many friends who use are more likely to have used themselves as well as being more likely to have witnessed use by others. Thus, Perceived Peer Marijuana Use could potentially influence multiple types of expectancies and motives. Consistent with this, Johnson et al. (2006) found paths from Perceived Peer Drinking Environment to Enhancement, Social, and Coping motives for drinking in an adult community sample.

The importance of one's perceptions of peer substance use likely extends beyond alcohol to marijuana use as well.

Social Motives

Patterns of results. In the alcohol literature, social motives for drinking have not been examined as frequently as coping and enhancement motives. In addition, previous research that has examined social motives for drinking has found somewhat inconsistent results. Social motives have been examined even less frequently in previous marijuana research. In college student samples, Johnson et al. (2005) found a small (.15) direct path between social motives and alcohol consumption, whereas Read et al. (2003) did not find this relationship. Simons et al. (1998) found that social motives were significant predictors of alcohol use but not significant predictors of marijuana use. These inconsistent results and the lack of emphasis on Social motives for marijuana use in the literature suggest that future research should continue to focus on examining social motives for alcohol/marijuana use as a predictor of alcohol/marijuana consumption.

In the present study, Social motives did not predict marijuana use. This result is consistent with the findings of Read et al. (2003) and Simons et al. (1998). Previous research has also indicated that Social and Enhancement motives are highly related and tend to significantly overlap with each other. It may be that in the current study Enhancement motives are cancelling out the Social motives, as they have been shown to do in previous research on motives for drinking.

Predictors of Social motives. Previous studies in the alcohol literature have found that alcohol offers and perceptions of peer drinking predict social motives for drinking (Read et al., 2003). Johnson et al. (2005) and Drerup (2005) found very large paths from

Perceived Peer Drinking Environment and Social motives for drinking, with an adult community sample demonstrating a larger path than the college student sample. These paths are consistent with affiliation with heavy drinking peers leading individuals to develop stronger social motives for drinking, presumably through social modeling and/or through direct experience with drinking in social settings. The same may be said for marijuana use. Andrews et al. (2002) suggested that peer substance use has an effect on the subsequent use of a young adult. Willner (2001) concluded that exposure to positive drug-related opinions and attitudes may increase positive marijuana expectancies. In the present study there was a direct, positive relationship between Perceived Peer Marijuana Use and Social motives for marijuana use. Therefore, it is possible that socialization effects occur in that some college students will form positive opinions about marijuana use by perceiving their peers as enjoying using marijuana. However, it is also possible that high Social motives for marijuana use cause individuals to seek out and socialize with marijuana users or to frequent social contexts where marijuana is easily available. In addition, these two concepts of socialization and peer selection may be reciprocally influencing each other. Longitudinal studies could help clarify the direction of causality.

In addition to perception of peers' drinking/drug use, a relationship between social reinforcement expectations about drinking and Social motives for drinking has been established (Read et al., 2003). A large path (.44) between Social and Sexual Facilitation expectancies and Social motives for marijuana use was found in the present study. In the current study there was no significant connection between Social motives for marijuana use and marijuana related problems. However, Simons et al. (1998) found that individuals who use marijuana for social reasons may be especially in danger of

experiencing negative consequences related to their marijuana use. Therefore, future studies may wish to further examine the relationship between Social motives and negative consequences of marijuana use.

Surprisingly, the present study also found a small yet significant path (.13) from self-reported symptoms of psychopathology (BSI total score) to Social motives for marijuana use. One potential explanation for this finding is that the individuals endorsing symptoms of psychopathology are experiencing higher levels of social anxiety or anxiety surrounding peer relationships in the college setting. Therefore, these individuals are using marijuana for social reasons in order to be able to enjoy themselves more at parties and in other collegiate social settings. Future studies could test this explanation through the use of measures that specifically assess for social discomfort or social anxiety.

Expansion Motives

Patterns of results. Expansion motives are unique to marijuana use due to its mild psychedelic properties (e.g., alterations in perception, enhanced senses, distortions in judgment of space and distance) and have not been well studied in previous research. Simons et al (1998) found in their factor analysis that expansion motives are separate from social, enhancement, and coping motives. However, like enhancement motives, expansion motives are important predictors of heavier marijuana use in young people (Simons et al., 1998). This relationship was also found in the present study. As expected, there was a positive, direct path (.23) between Expansion motives and marijuana use. In fact, in addition to Enhancement motives, Expansion motives were one of the strongest predictors of marijuana use in the present study.

Predictors of Expansion Motives. Grossman and Eisenman (1971) hypothesized that openness to experience would be related to marijuana use in college students. Flory et al. (2000) found that high openness to experience was associated with symptoms of marijuana abuse. However, no previous study had examined the possibility that Expansion motives may be mediating the relationship between Openness to Experience and marijuana use. The present study found that this mediational relationship did occur. A path was found from the personality variable of Openness to Experience to marijuana use (.16). Due to the fact that marijuana has subtle effects on perceptual and cognitive processes it is reasonable to assume that individuals who are more open to these types of creative experiences, or to unusual experiences in general, may seek to use marijuana in order to expand or alter their typical view of reality. The present study suggests that the concept of Openness to Experience as an aspect of one's personality may be important for understanding marijuana use.

The present study hypothesized that Perceptual and Cognitive Enhancement expectancies would also be linked to Expansion of perceptual and cognitive experience motives for marijuana use. Although no previous research has examined this relationship, it could be assumed that if one expects that marijuana will lead to perceptual and cognitive enhancement, this individual may use the drug to expand their typical view of reality. There was in fact find a significant path (.34) from Perceptual and Cognitive Enhancement expectancies to Expansion motives. Therefore, in the current study Expansion motives seem to mediate the relationship between Perceptual and Cognitive Enhancement expectancies and marijuana use.

As hypothesized, Openness to Experience and Perceptual and Cognitive Enhancement expectancies were the only two exogenous variables to have paths to Expansion motives for marijuana use. Of the five motives for marijuana use, the Expansion motive was the only motive in the present study to not have non-hypothesized variables linked to it. Expansion motives are also unique to marijuana and not found in the alcohol motives literature. Therefore, this study further validates Simons et al.'s (1998) finding that this fifth factor is unique and separate from Enhancement, Social, Coping, and Conformity motives for marijuana use.

Conformity Motives

Patterns of results. The alcohol and marijuana literature has varied significantly in regard to Conformity motives. Cox and Klinger (1988) stated that personality characteristics such as nonconformity have been linked with alcohol use. Cooper (1994) found that conformity motives are positively related to alcohol use, and that males showed stronger conformity motives to drink than females. Simons et al. (1998) found that Conformity motives were significant predictors of increased alcohol use but not significant predictors of increased marijuana use. Overall, Conformity motives for alcohol and marijuana use have generally received relatively low rates of endorsement in previous studies (Simons et al., 1998; Cooper, 1994). However, the present study found a negative, direct relationship between Conformity motives and marijuana use, suggesting that in the current sample of college students, using marijuana to fit in with others predicts less marijuana use. This result is similar to previous research examining conformity motives and alcohol use. Cooper's (1994) initial work in the development of an alcohol motives measure found that Conformity motives sometimes predicted less

alcohol use. Johnson and Sheets (2004) also found that Conformity motives for playing drinking games predicted less adverse consequences of play.

The negative relationship found in the present study between Conformity motives and marijuana use may be due to the nature of conformity itself. It may be that individuals who are using marijuana for conformity reasons are only using it to fit in socially. Since the motive for use is to “fit in” more than to experience an altered state, these individuals require minimal use of marijuana to achieve this goal. Therefore, these individuals may have an incentive to use marijuana (i.e. not be made fun of, not stand out as a non-user), but this incentive leads them to use less than other incentives might. Also, these individuals would be less likely than other marijuana users to smoke outside of a group context. Therefore, it is possible that Perceived Peer Drug Use may moderate the relationship between Conformity motives and marijuana use.

Predictors of Conformity Motives. The present study hypothesized that both Agreeableness and Conscientiousness would predict Conformity motives for marijuana use. This relationship did not occur in the current sample of college students. Unfortunately, no studies to date have evaluated the possible relationship between Conscientiousness and Agreeableness and the various motives for using marijuana. Therefore it was unclear how these two personality constructs were going to relate to motives for marijuana use. Not only did Agreeableness and Conscientiousness not predict Conformity motives, they did not predict any other motives in the present study. It may be that the personality constructs of Agreeableness and Conscientiousness are not strongly linked to marijuana use, let alone motives for marijuana use. Individuals high in

conscientiousness may not be likely to use drugs at all due to their high motivation for achievement and success. They may view drugs as a deterrent to their goals.

One possible explanation for the lack of a significant relationship between Agreeableness and Conformity motives is that persons high in Agreeableness tend to be trusting, selfless, cooperative, and have close interpersonal interactions. These personality traits are not conducive to drug use. In fact, Flory et al. (2002) found that low Agreeableness was related to substance abuse, suggesting that individuals who abuse marijuana are typically untrusting and uncooperative. Therefore, the personality construct of Agreeableness is likely not tapping into the aspects of personality that are linked to marijuana use, whether directly or indirectly through Conformity motives. Also, individuals that are high in Agreeableness may not need to use marijuana because they are already able to form positive social relationships without involving drug use. The personality construct of Agreeableness may not lead one to go along with any crowd just for the sake of agreeing. Rather, Agreeableness may be more related to forming strong positive relationships. Nevertheless, individuals that have very high levels of Agreeableness may be more likely to use marijuana for Conformity reasons, especially if these individuals are also high in Neuroticism or social anxiety.

In the present study Neuroticism also predicted Conformity motives for marijuana use. Perhaps individuals who tend to be more insecure and anxious may use marijuana as a way to fit in with peer groups and not feel as isolated rather than using it to obtain social reinforcement or avoid negative emotions (e.g., they are trying to avoid social rejection). Similarly, in the present study self-reported symptoms of psychopathology also predicted Conformity motives. It may be that in the present sample, the personality

constructs that are being accessed by the Brief Symptom Inventory and the Neuroticism questions on the NEO-FFI may be quite similar in terms of predicting Conformity motives. Neuroticism in and of itself involves affective dysregulation, so perhaps the psychopathology and the Neuroticism exogenous variables are tapping into the same personality constructs in terms of Conformity motives.

Another reason that Neuroticism and psychopathology may have predicted Conformity motives is that when individuals who tend to be more anxious and neurotic feel stressed or anxious, they may only use marijuana under specific circumstances. They may only be using as a way of coping with social anxiety. It could be that socially anxious individuals have high levels of neuroticism and/or high levels of psychopathology and engage in marijuana use to avoid further discomfort that might result by declining use. This differs from Coping motives in that these individuals are not trying to escape negative affect. Instead, it is the fact that they are not fitting in that is driving their negative emotions.

In addition, there may be additional factors such as social anxiety or cognitive and behavioral impairment expectancies that are moderating the relationship between Neuroticism and Conformity motives or between symptoms of psychopathology and Conformity motives. For instance, individuals who have social anxiety and high Relaxation and Tension Reduction expectancies may use marijuana because of their desire to release tension in social settings. Therefore, they may be using for Conformity reasons. Their social anxiety or the tension reduction expectancies may be moderating the relationship between their symptoms of distress and Conformity motives. Also, if an individual has high expectancies that marijuana will cause cognitive and behavioral

impairment, the more negative emotions they feel due to social anxiety may also lead them to use less marijuana, but when they do use it is more for conformity reasons than for social or coping reasons. Therefore, cognitive and behavioral impairment expectancies may also potentially moderate the relationship between Neuroticism/Psychopathology and Coping or Conformity motives. Cognitive and Behavioral Impairment expectancies may also moderate the effect of Conformity motives on marijuana use.

Marijuana Use

As mentioned earlier, three of the five motives that were expected to have a path to marijuana use were in fact linked to use. These three motives were Expansion, Enhancement, and Conformity. The present study did not find a relationship between either Coping or Social motives and marijuana use. In addition to the three motives that were found to be linked to marijuana use, there was also a large path (.42) from the exogenous variable of Perceived Peer Marijuana Use to marijuana use. There are several possible explanations for the relationship between Perceived Peer Marijuana Use and marijuana use. Socialization theory suggests that peers socialize people into using drugs or not using drugs. It may be that individuals who are around friends that use marijuana are more likely to use marijuana themselves because they see their friends enjoying the drug. The second theory, peer selection, states that people select drug-using or non-drug-using peers based on their beliefs about drugs. Perceived Peer Marijuana Use may have such a significant link to marijuana use because individuals already see marijuana use in a positive light and are choosing to associate with peers that will feel the same way and not shun them for their interest in using marijuana.

The direct path from Perceived Peer Marijuana Use to marijuana use suggests that some factor other than motives is also influencing marijuana use. It could be that situational demands such as peer pressure or drug availability contribute to use that occurs automatically, or without a lot of forethought. Marijuana dependence could bypass motives for use due to use becoming more automated. Marijuana dependence may also create motives for use that were not measured by the Motives for Marijuana Use scale. An example of such motives could be using marijuana to reduce cravings.

Marijuana Related Problems

As expected, the path from marijuana use to marijuana-related problems was strong (.63). This relationship has been found in most studies examining both alcohol and marijuana use and problems (Cooper et al., 1995; Read et al., 2003; Simons et al., 2005). This relationship makes intuitive sense that the more marijuana an individual consumes, the more he/she is likely to encounter marijuana-related problems such as going to work or school high, experiencing tolerance effects or withdrawal symptoms, or neglecting responsibilities.

The present study also found a path from Coping motives to marijuana-related problems. Once again, this relationship has been found elsewhere in the alcohol and marijuana motives literature (Cooper et al., 1995; Wills et al., 1999; Simons et al., 2005). Individuals who use marijuana to cope may rely more heavily on maladaptive forms of emotional coping than individuals who use marijuana for other reasons. These maladaptive forms of coping through marijuana use could result in more negative consequences. An individual who uses marijuana for social or enhancement reasons may embarrass themselves in front of others or be told by a friend that they are using too

much, but their use may not likely impact their school or work performance. They also may not use as frequently if they are only using in social settings. Individuals who use marijuana to cope, on the other hand, may not have formed more adaptive ways of handling negative emotions such as anxiety or depression. A possible scenario is that these individuals will use whenever they are feeling stressed and will have strong beliefs in marijuana's tension reduction properties. Future studies could further examine the direct relationship between Coping motives and marijuana-related problems by testing whether individuals who are high on Coping motives are low in other types of coping skills. Future studies could also examine how likely individuals are to use marijuana in specific situations and how the situational aspects of use relate to motives.

A more surprising finding in the present study was the direct relationship between the personality construct of Neuroticism and marijuana-related problems. Based on the findings of previous studies (Cooper et al., 2000; Hussong, 2003), the present study hypothesized that the relationship between Neuroticism and marijuana use/problems would be mediated by Coping motives. One possible explanation for the direct relationship in this study is that variables that involve significant negative affect, such as Neuroticism, may influence substance use consequences in a manner not mediated by motives or use frequency. Simons and Carey (2002) found that affect dysregulation variables increased risk for marijuana-related problems independent of more established risk factors, such as gender and lifetime use. It may be that both Neuroticism and marijuana-related problems are part of a broader construct. Jessor and Jessor (1984) proposed that many problem behaviors can be explained by examining the individual characteristics of a person in the contexts defined by his/her environment. Simultaneous

exploration of both individual and environmental factors and their relationship to maladaptive behavior patterns may have implications for better recognizing the developmental patterns that lead to marijuana use and problems. Another possibility is that the direction of causality is reversed in that experiencing a large amount of marijuana-related problems may result in individuals being higher in Neuroticism. Alternatively, higher levels of Neuroticism could be related to the paranoid responses that some individuals experience when using marijuana.

The current study also found a direct, positive relationship between impulsive sensation seeking and marijuana-related problems. Simons et al. (2005) also found a significant relationship between impulsivity and marijuana problems in their most recent study, but they found no relationship between sensation seeking and marijuana-related problems. Other studies (Simons, 2003; Simons & Carey, 2002) have also found a relationship between impulsivity and marijuana problems. One possible explanation for this direct relationship is that individuals who are more prone to impulsive behavior while under the influence are more likely to engage in behaviors that are relatively unrestrained and have a greater potential to cause conflict with social expectations and environmental demands. Therefore, more substance-related problems arise as a result of their impulsive sensation seeking. The marijuana problems measure used in the present study includes items that may be addressing more impulsive behavior (e.g., “get into fights, acted bad or did mean things”). Also, impulsive individuals are more likely to engage in dangerous, risky, or illegal behaviors in general, with the effects of drug use serving to increase the likelihood of these behaviors.

Gender

Another interesting finding in the present study was a direct association between Gender and marijuana use. Even with everything else that is included in the model as potential mediating factors, a direct effect of gender on marijuana use was still found (.12). Even after controlling for numerous other variables, men reported higher levels of marijuana use than women. Simons et al. (2005) also found a significant relationship between Gender and marijuana use in their study, with male gender being associated with increased marijuana use. In the present study, the sample of males and females did not differ significantly in terms of age or ethnicity. Thus, the direct relationship between Gender and marijuana use was not mediated by either of these demographic variables. This suggests that the relationship may be due to socialization into specific gender roles related to drug use or other factors, such as parental roles. Most theoretical models addressing women's roles have focused on why women drink or use drugs, rather than explaining the differences in prevalence of drinking/drug use in men and women (Jung, 2001).

Alternatively, other potential mediators of the gender-drug use relationship could include different forms of leisure activity in men and women, differences in type of employment or income, different contexts where drug use may occur for men and women, different past experiences with drugs, or perhaps other factors as well. Jung (2001) also noted that some studies have suggested that women may underreport drinking/drug use relative to men due to the social stigma associated with alcohol/drug use and abuse in women. Such under-reporting could account for the type of direct effect of gender observed in the present study. Future studies should continue to explore factors that

could account for gender differences in marijuana use (and therefore have more personal experiences to serve as the basis for expectancies).

In addition to Gender having a direct link to use in the present study, a relationship was also found between Gender and Enhancement motives. Therefore, Enhancement motives were also mediating the relationship between Gender and marijuana use. Males reported Enhancement motives for using marijuana more than women. One possible explanation for this finding is that college-age males may have more positive expectancies related to using marijuana than female college students, and thus stronger motives for using marijuana for enhancement reasons. These increased positive expectancies may stem from the fact that males generally use marijuana more frequently and in larger quantities than females.

Additionally, gender was linked to Expansion motives in the present study. Therefore, Expansion motives were also mediating the relationship between Gender and marijuana use. Results indicate that men reported more Expansion motives for using marijuana more than women. Similar to the gender difference with Enhancement motives, it may be that males have more expectancies that marijuana will produce expansion of their experiential awareness. These increased expectancies are likely related to higher levels of marijuana use in males than females.

Implications of the Current Study

Theoretical Implications

Overall, the present study demonstrates the complexity involved in predicting marijuana use and marijuana related problems. It provides good support for the relationship between various affective/personality characteristics and marijuana

use/problems, primarily via motives for marijuana use. It may be that substance use models that treat substance use as a unitary phenomenon are less accurate than models that consider multiple etiological pathways leading to substance use and abuse. Focusing on underlying motives for marijuana use specifically may provide a useful way to conceptualize and operationalize these alternative pathways.

In the present study, not all of the paths to marijuana use and marijuana-related problems were mediated by motives. Therefore there could be other, unmeasured mediating variables that could account for the direct paths found in this study. Situational factors and peer marijuana use may be important, especially given the direct path found from Perceived Peer Marijuana Use to marijuana use. In addition, gender may be an important variable. It may be that gender roles serve as an unmeasured mediator of the hypothesized variables. Also, various situational contexts might mediate the relationship between gender and marijuana use.

Another theoretical implication to consider is the issue of automated drug use, mentioned earlier. If certain individuals have used marijuana in significant amounts and have developed a dependence on the drug, it may be that their use is so automatic that they are essentially bypassing consciously accessible motivations for their use.

Practice Implications

The present study indicates that much of why students use marijuana can be explained by exploring their motives for marijuana use. Understanding why students use marijuana may then provide information that could be useful for the prevention of marijuana use in college students. Mental health care workers (e.g., psychiatrists, psychologists, social workers) should have increased education and training on the

importance of various individual characteristics such as impulsivity, neuroticism, and cognitive expectancies in the prevention and treatment of substance abuse, as well as various resources available in the area. For instance, individuals high on the personality construct of Openness to Experience may be more likely to use marijuana as a way to expand their perceptions of reality. Mental health care workers could therefore focus treatment on finding other ways for these clients to expand their minds and enhance their openness to experience, such as through meditation, spirituality, guided self-reflection through autobiographical writing or sharing, or other creative endeavors such as art and music.

Also, impulsive sensation seeking demonstrated a consistent relationship with marijuana related problems after controlling for other affective and personality variables, motives, and use. It may be that marijuana-related problems are partly a function of difficulties in self-control. Individuals who have problems controlling their behavior may be at increased risk for developing substance-related problems. Interventions and prevention efforts may benefit from improving self-regulation abilities in addition to reducing use itself. Mental health care professionals should be prepared to explore and discuss various aspects of client's personality, motives and expectancies regarding drug use, and the client's ability to regulate affect when appropriate, or refer clients to suitable treatment programs to support their recovery.

Finally, the present study demonstrated that motives for marijuana use (coping, social, enhancement, expansion, conformity) mediated many of the relationships between personality and affective characteristics and marijuana use/problems. The present study suggests that interventions to reduce marijuana use among college students could target

motives for marijuana use. There should especially be a focus on identifying factors that contribute to Coping motives for marijuana use, due to the fact that Coping motives and marijuana related problems are directly linked.

Addressing individuals' reasons for using marijuana in a clinical setting may provide a means of reducing marijuana use. Individuals who use marijuana in order to enhance positive affect might benefit from learning other ways to have a good time. Mental health professionals could accomplish this by providing reinforcing non-drug related activities, offering recreational therapy opportunities, or using social skills training to improve the individual's ability to obtain social reinforcement. Individuals who are using marijuana to obtain social rewards may benefit from social skills training and/or relationship counseling. Finding alternative peer groups might also be helpful for these individuals as well as those with high scores on Perceived Peer Drug Use measures. Limiting peer marijuana use via substance-free organizations may also benefit these youths. Individuals who use marijuana for coping reasons might benefit from coping skills training, stress management training and cognitive interventions. They also may benefit from social skills training that could assist them in obtaining adequate social support to help decrease the effects of stress. For those individuals who identify Expansion motives for use, there may be non-drug related ways of helping them expand their consciousness.

Prevention efforts may involve social skills training or social network restructuring in order to reduce the number of peers that use marijuana or enlisting the help of campus organizations to promote awareness of the negative effects of marijuana use. These results also demonstrate support for the use of motivational interviewing

techniques within a college student population. The purpose of motivational interviewing is to enhance intrinsic motivation to change by exploring and resolving ambivalence (Miller & Rollnick, 2002). It is a theoretical model that seeks to examine what goals an individual is trying to achieve through his/her drug use. Therefore, using motivational interviewing with college students may help make them more aware of their reasons for using marijuana at which point change in their drug use can be initiated.

Strengths and Limitations

There are two major strengths of the present study. Simons et al. (1998) have demonstrated that marijuana motives are useful constructs for understanding both marijuana use and consequences. This study expands on their work by replicating some of their findings regarding the use of marijuana for affect regulation and examining additional motives that seem to be involved in marijuana use and dependence. In addition, the measures used in this study are all well established and show adequate reliability and validity. Most of the previous research in the area of marijuana motives has not examined how several of the predictors that have already been shown to be linked to marijuana use are associated with motives for marijuana use. It is likely that these motives may be mediating the relationship between the predictors of marijuana use and marijuana use and problems.

One of the major limitations of the present study is the use of a cross-sectional sample. Path models demonstrate patterns of association among variables, but causation cannot be inferred from the correlational data. The direction of some of the relationships among variables might differ from the relationships specified in the path models. For example, the present study found an association between perceived peer marijuana use

and social motives. The present study assumed that perceived peer marijuana use would affect one's motives for using marijuana use for social reasons, based on the idea that some college students will form positive opinions about marijuana use by perceiving their peers as enjoying using marijuana. However, it is also possible that high Social motives for marijuana use cause individuals to seek out and socialize with heavy marijuana users or to frequent social contexts where marijuana is easily available. Through use of a longitudinal design it might be possible to establish a temporal sequence for the relationship between peer group marijuana use and social motives, thus providing a stronger test of causal relationships.

Generalizability represents another limitation due to the sample utilized in the present study. The final sample of the study was a good representation of the population of Indiana State University. However, the results based on this sample may not generalize to different populations, such as Hispanic or Asian individuals from different areas of the country (e.g., the Southwest). Although the present study controlled for gender and the distribution of females compared to males was similar to the population percentages for Indiana State University students, future studies may still wish to examine whether the paths created in the present study would differ between males and females.

The present sample included a relatively low frequency of heavy marijuana users. When asked about their peak quantity of marijuana used in the past six months, 48% of the sample reported no use in the past six months. Of the individuals who had used in the past six months, 13% reported using marijuana less than once a month but at least once in the past six months. Only about 4% reported using marijuana more than once a day.

Perhaps heavy marijuana users are less motivated to attend class and sign up for extra credit opportunities offered through their classes than other students. In addition, these individuals may be less likely to agree to complete the survey due to the illegal nature of their drug use. Also, heavy marijuana users might be less likely to be in college in the first place. The importance of examining more heavy marijuana use is that there may be different patterns of use between individuals who are marijuana dependent and those who are not. In individuals with marijuana dependence, use may be more likely to be an automated behavior. Heavy users may be using marijuana to manage cravings and urges or reduce withdrawal symptoms. Heavy users will also have developed a higher tolerance, so a given amount of marijuana will produce different effects than in a non-dependent individual. Future studies may wish to only examine marijuana motives in heavy users or include only individuals who have used marijuana within the last year.

Another limitation in terms of generalizability is the lack of diversity in racial background among participants. Approximately 80% of the original sample identified themselves as Caucasian. Only 14% of the original sample was African American, and other races were represented at less than one percent. In addition, the present study found no differences in prevalence of marijuana use based on race. National data indicates that a greater percentage of African-American and Hispanic men use marijuana than Caucasian men (SAMHSA, 2003). Future research should attempt to recruit participants from a variety of racial and ethnic backgrounds to determine how motives for marijuana use may differentially impact marijuana use/marijuana related problems in these racial and ethnic groups.

Finally, measurement issues present potential limitations for the current study. Although the measures used in the present study have all shown adequate reliability and validity in and of themselves, it may be that combining the measures into a single questionnaire creates issues with response format and context effects. The different measures used in the questionnaire had different response formats. Some measures required participants to answer yes/no or true/false. Others utilized 5-point or 6-point scales. All had differing anchors at each scale point. Each measure was validated using its own response format. Using multiple response formats in the one questionnaire may have confused respondents and caused them to make erroneous responses. This was especially an issue with the marijuana expectancies measure, in which agreement/disagreement were anchored on opposite ends from the other measures. Additionally, completing one measure may have influenced scores on other measures. These mutual influences can lead to spurious correlations between the measures (Whitley, 2002). These context effects occur when participants fill out two or more questionnaires they believe are related to each other, as was the case in the present study. These context effects could be reduced by randomly intermixing the items from each measure when compiling the questionnaire or by counterbalancing the order of presentation of measures administered.

Another measurement issue is that of the NEO-FFI scale. As mentioned earlier, the last 29 items on the NEO-FFI were omitted from the questionnaire that was administered to study participants. Having shorter subscales assessing each of the five personality constructs likely resulted in less variation, therefore weakening the relationships between the NEO-FFI scales and the other variables.

An additional potential limitation for the present study is the reliance on self-report data. Participants may be underreporting marijuana use and marijuana related problems. If enough students do this, the result may be an underestimation of the influence of marijuana motives on marijuana use. However, even though the social desirability bias and illegality of marijuana use may have influenced participants, the confidential nature of the study likely encouraged more accurate responding to questions. This problem of self-report data is not unique to the present study. The majority of studies on alcohol and marijuana use also rely on self-report, and research suggests that self-reports of use are generally reliable and valid (Johnston & O'Malley, 1985). A final possible limitation is that we may not have sampled the entire domain of marijuana motives because motives for marijuana use may have existed that were not easily accessed through the questionnaire items.

Suggestions for Future Research

A considerable amount of research has been conducted regarding motives for drinking. On the other hand, research examining motives for marijuana use is still in its early stages. Therefore, the present study provided a comprehensive examination of the relationships between various personality and affective variables and motives for marijuana use. Many of the common theories regarding motives for substance use were supported. However, the complexity of the present study may have resulted in the possibility that there is more than one explanation for several of the relationships that were found. Therefore, future studies could examine the relationship between fewer variables in closer detail. Research suggestions include creating more specific hypotheses based on this study's findings, as well as creating a stronger research design.

A longitudinal design would be beneficial in order to establish a sense of causality among the variables. Future studies may also wish to use methods other than self-report to assess motives for marijuana use. Results from the present study suggest that the motivational model is a fruitful way of understanding influences on marijuana use. There are several personality and affective variables that appear to affect marijuana use and marijuana related problems through motivational pathways. The present study considered the relationships among several exogenous variables as well as among all five motives for marijuana use. Future studies may wish to narrow the focus of the study in order to more closely examine how certain personality, affective, cognitive, and social factors could be mediated by motives for marijuana use. Suggestions include using measures that specifically assess for social anxiety and examining how the situational aspects of use relate to motives.

Future research should also begin to examine factors that might moderate the relationship between various personality/affective variables and marijuana use/problems. It may be that some of the relationships posited in the present study are not mediational relationships but moderational relationships (e.g. the possible moderational effect of Cognitive and Behavioral Impairment expectancies on the relationship between Conformity motives and marijuana use). Further research should also extend the concept of marijuana motives as a mediator between the explored predictors and marijuana use to populations other than college students. In addition, future studies should include examining more diverse samples, as well as examining factors that could account for gender differences in marijuana use. Results should be extended to a more diverse racial/ethnic population. Another population to which future research could expand is a

treatment and/or recovery sample of individuals with marijuana dependence. It may be that using marijuana in an abusive or dependent fashion greatly affects motives for marijuana use.

While the original motivational model used with alcohol (Cox & Klinger, 1988) proposed that motives for *not* drinking also contributed to individuals' decisions about drinking, less research has focused on such motives (Johnson & Cohen, 2004) in either alcohol or marijuana use. Future studies should also explore the impact of personality and affective characteristics on motives for not using marijuana or motives for limiting marijuana use.

The present study found strong support for a connection between marijuana outcomes and personality and affective variables, as mediated by motives for marijuana use. A number of unexpected relationships were found; further research would be helpful to clarify the strength and direction of these associations. A longitudinal study examining motives for marijuana use and marijuana outcome variables over time would also be helpful in clarifying these relationships. Finally, development of prevention and/or treatment programs based on the implications of the present study is another avenue for further research.

REFERENCES

REFERENCES

- Aarons, G.A., Brown, S.A., Stice, E., & Coe, M.T. (2001). Psychometric evaluation of the marijuana and stimulant effect expectancy questionnaires for adolescents. *Addictive Behaviors, 26*, 219-236.
- Andrews, J.A., Tildesley, E., Hops, H., & Li, F. (2002). The influence of peers on young adult substance use. *Health Psychology, 21*(4), 349-357.
- Andrucci, G.L., Archer, R.P., Pancoast, D.L., & Gordon, R.A. (1989). The relationship of MMPI and sensation seeking scales to adolescent drug use. *Journal of Personality Assessment, 53*(2), 253-266.
- Austin, M., Brosh, J., Dous, J., Iannella, G., Outten, R., Rowles, P., et al. (2003). The relationship between personality and self-reported substance use: exploring the implications for high school and college educational programs. (Report No. 473159). Pennsylvania: National Center for Research on Teacher Learning. (ERIC Document Reproduction Services No. ED473159).
- Baer, J.S. (2002). Student factors: understanding individual variation in college drinking. *Journal of Studies on Alcohol Supplement, 63*, 40-54.
- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Upper Saddle River, NJ, US: Prentice-Hall, Inc.
- Bentler, P.M. (1995). EQS structural equations program manual. Los Angeles: BMDP Statistical software.
- Bentler, P.M., & Bonett, D.G. (1980). Significance test and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*, 588-606.

- Brooks, J.S., Balka, E.B., Gursen, M.D., Brook, D.W., Shapiro, J., & Cohen, P. (1997). Young adults' drug use: a 17-year longitudinal inquiry of antecedents. *Psychological Reports, 80*, 1235-1251.
- Brown, S.A., Christiansen, B.A., & Goldman, M.S. (1987). The alcohol expectancy questionnaire: an instrument for the assessment of adolescent and adult alcohol expectancies. *Journal of Studies on Alcohol, 48*, 483-491.
- Chabrol, H., Duconge, E., Casas, C., Roura, C., & Carey, K.B. (2005). Relations between cannabis use and dependence, motives for cannabis use and anxious, depressive and borderline symptomatology. *Addictive Behaviors, 30*, 829-840.
- Christiansen, B.A., & Goldman, M.S. (1983). Alcohol-related expectations versus demographic/background variables in the prediction of adolescent drinking. *Journal of Consulting and Clinical Psychology, 51*, 249-257.
- Comeau, N., Stewart, S.H., & Loba, P. (2001). The relation of trait anxiety, anxiety sensitivity and sensation seeking to adolescents' motivations for alcohol, cigarette and marijuana use. *Addictive Behaviors, 26*(6), 803-825.
- Cooper, M.L. (1994). Motivations for alcohol use among adolescents: development and validation of a four-factor model. *Psychological Assessment, 6*(2), 117-128.
- Cooper, M.L., Agocha, V.B., & Sheldon, M.S. (2000). A motivational perspective on risky behaviors: the role of personality and affect regulatory processes. *Journal of Personality, 68*(6), 1059-1088.
- Cooper, M.L., Frone, M.R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: a motivational model of alcohol use. *Journal of Personality and Social Psychology, 69*(5), 990-1005.

- Cooper, M.L., Russell, M., Skinner, J.B., Frone, M.R., & Mudar, P. (1992). Stress and Alcohol use: moderating effects of gender, coping, and alcohol expectancies. *Journal of Abnormal Psychology, 101*(1), 139-152.
- Costa, P.T., & McCrae, R.R. (1989). *The NEO-PI/NEO-FI manual supplement*. Odessa, FL: Psychological Assessment Resources.
- Cox, W.M., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*(2), 168-180.
- Derogatis, L.R. (1993). *Brief Symptom Inventory (BSI): Administration, Scoring, and Procedures Manual, 3rd ed.* Minneapolis: National Computer Systems.
- Donohew, R.L., Hoyle, R.H., Clayton, R.R., Skinner, W.F., Colon, S.E., & Rice, R.E. (1999). Sensation seeking and drug use by adolescents and their friends: models for marijuana and alcohol. *Journal of Studied on Alcohol, 60*(5), 622-631.
- Douglas, K.A., & Collins, J.L. (1997). Results from the 1995 national college health risk behavior survey. *Journal of American College Health, 46*(2), 55-67.
- Drerup, M.L. (2005). Religion, spirituality, and motives for drinking in an adult community sample. (Doctoral dissertation, Indiana State University, 2005). *Dissertation Abstracts International, 66* (12), 6918.
- Eisenman, R., Grossman, J.C., & Goldstein, R. (1980). Undergraduate marijuana use as related to internal sensation novelty seeking and openness to experience. *Journal of Clinical Psychology, 36*(4), 1013-1019.

- Flory, K., Lynam, D., Milich, R., Leukefeld, C., & Clayton, R. (2002). The relations among personality, symptoms of alcohol and marijuana abuse, and symptoms of comorbid psychopathology: results from a community sample. *Experimental and Clinical Psychopharmacology*, 10(4), 425-434.
- Galizio, M., Rosenthal, D., & Stein, F.A. (1983). Sensation seeking, reinforcement, and student drug use. *Addictive Behaviors*, 8(3), 243-252.
- Goldman, M.S. (1994). The alcohol expectancy concept: applications to assessment, prevention, and treatment of alcohol abuse. *Applied and Preventive Psychology*, 3, 131-144.
- Green, B.E., & Ritter, C. (2000). Marijuana use and depression. *Journal of Health and Social Behavior*, 41(1), 40-49.
- Grossman, J., & Eisenman, R. (1971). Experimental manipulation of authoritarianism and its consequent effects on creativity. *Journal of Consulting and Clinical Psychology*, 36, 238-244.
- Health Risks for Marijuana Use (1996). *American Family Physician*, 53(1), 388.
- Higher Education Center for Alcohol and Other Drug Prevention (2003). *Marijuana use among students at institutions of higher education*. Retrieved October 6, 2003, from <http://www.edc.org/hec/pub/prev-updates/marijuana.html>.
- Hoyle, R.H., & Panter, A.T. (1995). Writing about structural equation models. In R.H. Hoyle (Ed.) Structural equation modeling: Concepts, issues, and applications. (pp. 158-176). Thousand Oaks, CA: Sage Publications.

- Hughes, T.L., Day, L.E., Marcantonio, R.J., & Torpy, E. (1997). Gender differences in alcohol and other drug use among young adults. *Substance Use & Misuse*, 32(3), 317-342.
- Hull, C.L. (1951). *Essentials of Behavior*. New Haven: Yale University Press.
- Hussong, A.M. (2003). Social influences in motivated drinking among college students. *Psychology of Addictive Behaviors*, 17(2), 142-150.
- Jessor, R., & Jessor, S.L. (1984). Adolescence to young adulthood: a 12-year prospective study of problem behavior and psychosocial development. In S.A. Mednick, M. Harway, & K.M. Finello (Eds.) Handbook of longitudinal research, Volume 2. Teenage and adult cohorts, 34-61.
- Johnson, T.J., & Cohen, E.A. (2004). College students' reasons for not drinking and not playing drinking games. *Substance Use & Misuse*, 39(7), 1137-1160.
- Johnson, T.J., & Sheets, V.R. (2004). Measuring college students' motives for playing drinking games. *Psychology of Addictive Behaviors*, 18, 91-99.
- Johnson, V. & White, H.R. (1989). An investigation of factors related to intoxicated driving behaviors among youth. *Journal of Studies on Alcohol*, 50, 320-330.
- Johnston, L.D., & O'Malley, P.M. (1985). Issues of validity and population coverage in student surveys of drug use. In B.A. Rouse, N.J. Kozel, & L.G. Richards (Eds.), *Self-report methods of estimating drug use: meeting current challenges to validity*. Washington DC: U.S. Government Printing Office.
- Jones, B.T., Corbin, W., & Fromme, K. (2001). Half full or half empty, the glass still does not satisfactorily quench the thirst for knowledge on alcohol expectancies as a mechanism of change. *Addiction*, 96(11), 1672-1674.

- Jung, J. (2001). *Psychology of Alcohol and Other Drugs*. Thousand Oaks, Ca.: Sage Publications.
- Kuhn, C., Swartzwelder, S., & Wilson, W. (1998). *Buzzed*. New York: W.W. Norton & Company.
- Loukas, A., Krull, J.L., Chassin, L., & Carle, A.C. (2000). The relation of personality to alcohol abuse/dependence in a high-risk sample. *Journal of Personality*, 68(6), 1153-1175.
- Mash, E.J., & Terdal, L.G. (1976). *Behavior Therapy Assessment: Diagnosis, Design, and Evaluation* (2nd ed.). New York: Springer.
- McKim, W.A. (2003). *Drugs and Behavior: An Introduction to Behavioral Pharmacology* (5th ed.). New Jersey: Upper Saddle River.
- McMahon, J., Jones, B.T., & O'Donnell, P. (1994). Comparing positive and negative alcohol expectancies in male and female social drinkers. *Addiction Research*, 1(4), 349-365.
- Miller, P.M., Smith, G.T., & Goldman, M.S. (1990). Emergence of alcohol expectancies in childhood: a possible critical period. *Journal of Studies on Alcohol*, 51, 343-349.
- Miller, W.R., & Rollnick, S. (2002). *Motivational Interviewing: Preparing People for Change* (2nd ed.). New York: The Guilford Press.
- National Institute on Drug Abuse (n.d.). *NIDA InfoFacts*. Retrieved October 6, 2003, from <http://www.nida.nih.gov/Infofax/marijuana.html>.

- Newcomb, M.D., & Bentler, P.M. (1986). Substance use and ethnicity: differential impact of peer and adult models. *Journal of Psychology, 120*, 83-95.
- Newcomb, M.D., Chou, C., Bentler, P.M., & Huba, G.J. (1988). Cognitive motivations for drug use among adolescents: longitudinal tests of gender differences and predictors of change in drug use. *Journal of Counseling Psychology, 35*, 426-438.
- Patton, G.C., Coffey, C., Carlin, J.B., Degenhardt, L., Lynskey, M., & Hall, W. (2002). Cannabis use and mental health in young people: cohort study. *British Medical Journal, 323*, 1195-1198.
- Read, J.P., Wood, M.D., & Kahler, C.W. (2003). Examining the role of drinking motives in college student alcohol use and problems. *Psychology of Addictive Behaviors, 17*(1), 13-23.
- Substance Abuse and Mental Health Services Administration. (2003). *Results from the 2002 National Survey on Drug Use and Health: National findings* (DHHS Publication No. SMA 03-3836). Rockville, MD: U.S. Government Printing Office.
- Schafer, J., & Brown, S.A. (1991). Marijuana and cocaine effect expectancies and drug use patterns. *Journal of Consulting and Clinical Psychology, 59*(4), 558-565.
- Simons, J., Gaher, R.M., Correia, C.J., Hansen, C.L., & Christopher, M.S. (2005). An affective-motivational model of marijuana and alcohol problems among college students. *Psychology of Addictive Behaviors, 19*(3), 326-334.

- Simons, J., & Carey, K.B. (2002). Risk and vulnerability for marijuana use problems: the roles of affect dysregulation. *Psychology of Addictive Behaviors*, 16(1), 72-75.
- Simons, J., Correia, C.J., & Carey, K.B. (2000). A comparison of motives for marijuana use and alcohol use among experienced users. *Addictive Behaviors*, 25(1), 153-160.
- Simons, J., Correia, C.J., Carey, K.B., & Borsari, B.E. (1998). Validating a five-factor marijuana motives measure: relations with use, problems, and alcohol motives. *Journal of Counseling Psychology*, 45(3), 265-273.
- Staton, M., Leukefeld, C., Logan, T. K., Zimmerman, R., Lynam, D., Milich, R., et al. (1999). Risky sex behavior and substance use among young adults. *Health & Social Work*, 24(2), 147-155.
- Stewart, S.H., and Devine, H. (2000). Relations between personality and drinking motives in young people. *Personality & Individual Differences*, 29(3), 495-511.
- Stewart, J., de Wit, H., & Eikelbloom, R. (1984). Role of unconditioned and conditioned drug effects in the self-administration of opiates and stimulants. *Psychological Review*, 91, 251-268.
- Tiffany, S.T. (1990). A cognitive model of drug urges and drug use behaviour: Role of automatic and non-automatic processes. *Psychological Review*, 97, 147-168.
- Urberg, K., Degirmencioglu, S.M., & Pilgrim, C. (1997). Close friend and group influence on adolescent cigarette smoking and alcohol use. *Developmental Psychology*, 33, 834-844.

- Whitley, B.E., Jr. (2002). *Principles of research in behavioral science* (2nd ed.). Boston: McGraw-Hill.
- Willner, P. (2000). Further validation and development of a screening instrument for the assessment of substance misuse in adolescents. *Addiction*, 95, 1691-1698.
- Wills, T.A., Sandy, J.M., Yaeger, O.S., & Yaeger, A. (1999). Contributions of positive and negative affect to adolescent substance use: test of a bidimensional model in a longitudinal study. *Psychology of Addictive Behaviors*, 13(4), 327-338.
- Wills, T.A., & Shiffman, S. (1985). Coping and substance use: A conceptual framework. In S. Shiffman and T.A. Wills (Eds.), *Coping and substance use*. Orlando, FL: Academic Press.
- Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge: Cambridge University Press.
- Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. Hillsdale, NJ: Erlbaum.

APPENDIXES

APPENDIX A

Consent Form

You are invited to participate in a study of personality, emotions, and motives for marijuana use being conducted by Lindsey Hawkins, a graduate student in psychology at Indiana State University. This study is intended to examine how certain personality and emotional characteristics can affect college students' motives for using marijuana.

If you agree to participate, you will be asked to complete a series of questions regarding your personality, symptoms of anxiety and depression, past use of marijuana, problems related to using marijuana, motives for using marijuana, and expectations about the outcome of marijuana use. Even if you have never tried marijuana, your answers to the questions not pertaining to marijuana use and to the questions about expectancies about marijuana use are still valuable. Please try to answer all questions as honestly and completely as you can. However, there are no right or wrong answers to these types of questions. You are free to not answer any questions you find objectionable. Completing this set of questionnaires should take from 30-45 minutes.

For your own privacy, you should cover your answers with your copy of this consent form. In addition, we will be sure to seat you with one seat in between you and your neighbor to ensure your privacy. Since using marijuana is illegal, the researchers will be taking extra precautions to ensure that no one can connect your answers to the questionnaire with your name. We **WILL NOT** provide any information to your parents or the university about your responses to these questions. The questionnaires will not contain your name and will be marked with a code number. Therefore, your name will **NEVER** be associated with your answers. If a publication or presentation results from this study, we will not identify any of the participants and will present only the average results for groups of participants, not the results of individuals.

The only risk associated with your participation is that completing these questionnaires may make you think differently about your use of marijuana, your emotions, or other health related concerns. This could potentially lead you to conclude that such behaviors are problematic. While this may be a distressing recognition, such a recognition could lead to healthy changes in behavior. If you have concerns about your own marijuana use, you could contact the Student Counseling Center at 237-3939 or the ISU Psychology Clinic at 237-3317.

The benefits of your participation could include: 1) increased personal understanding of the process of survey research; 2) helping further scientific understanding of how different dimensions of personality and emotions relate to marijuana use; 3) possibly developing more personal insight regarding yourself, and 4) receiving extra credit for your participation.

You are under no obligation to participate. Even if you agree to participate, you may skip any items on the questionnaire that you cannot comfortably answer. You may also

discontinue your participation at any time without suffering any penalty for doing so except for the loss of your extra credit points associated with this research opportunity.

If you have any further questions about this study and your participation, you may contact Lindsey Hawkins at 237-3317 or pyhawk@isugw.indstate.edu.

This study has been reviewed and approved by the ISU Institutional Review Board (IRB) as adequately protecting the rights of participants. Any matter of concern may be addressed to the IRB department at (812) 237-8217 or irb@indstate.edu.

APPENDIX B

Demographics Form

Gender ☐ Female ☐ Male

Age ☐ 17 or less ☐ 18 ☐ 19 ☐ 20
 ☐ 21 ☐ 22 ☐ 23 or more

What is your ethnic background? (Select only one)

☐ Hispanic or Latino
☐ Not Hispanic or Latino

What is your race? (Select only one)

☐ African-American
☐ African
☐ Asian-American
☐ Asian
☐ Caucasian (White, Non-Hispanic)
☐ Native American or Alaska Native
☐ Native Hawaiian or Pacific Islander
☐ Mixed Race
☐ Other

What is your major in school?

☐ Communication
☐ Criminology
☐ English
☐ Family and Consumer Science
☐ Geography, Geology or Anthropology
☐ History
☐ Life Sciences
☐ Computer Science
☐ Political Science
☐ Psychology
☐ Social Work
☐ Sociology
☐ Other _____

APPNDIX C

Marijuana Use Questions

Have you ever tried marijuana? ☐ Yes ☐ No

How many times in your lifetime have you used marijuana?

- ☐ 1-5 times
- ☐ 6-9 times
- ☐ 10-19 times
- ☐ 20-39 times
- ☐ 40-59 times
- ☐ 60-79 times
- ☐ 80-99 times
- ☐ 100 or more times

How many times in the past 6 months have you used marijuana?

- ☐ no use
- ☐ less than once a month but at least once in the last 6 months
- ☐ once a month
- ☐ 2-3 times per month
- ☐ once or twice per week
- ☐ 3-4 times per week
- ☐ nearly every day
- ☐ once a day
- ☐ more than once a day

How many times in the past 30 days have you used marijuana?

- ☐ once
- ☐ twice
- ☐ three times
- ☐ once a week
- ☐ 2-3 days a week
- ☐ 4-6 days a week
- ☐ once a day
- ☐ more than once a day

APPENDIX D

Alternate Version of the Rutgers Alcohol Problem Index (RAPI)

Have any of the following things happened to you in your lifetime WHILE YOU WERE USING MARIJUANA OR BECAUSE OF YOUR MARIJUANA USE? If you have not ever used marijuana, check here. ☐

Please circle "Y" for YES and "N" for NO.

1. Not able to do your homework or study for a test? _____
2. Got into fights, acted bad or did mean things? _____
3. Missed out on other things because you spent too much money on marijuana? _____
4. Went to work or school high? _____
5. Caused shame or embarrassment to someone? _____
6. Neglected your responsibilities? _____
7. Friends, neighbors, or relatives avoided you? _____
8. Felt that you needed more than you used to use in order to get the same effect? _____
9. Tried to control your marijuana use by trying to use only at certain times of the day or in certain places? _____
10. Had withdrawal symptoms, (felt sick) because you stopped or cut down on marijuana? _____
11. Noticed a change in your personality? _____
12. Felt that you had a problem with marijuana? _____
13. Missed a day (or part of a day) of school or work? _____
14. Suddenly found yourself in a place that you could not remember getting to? _____
15. Passed out or fainted suddenly? _____
16. Kept using when you promised yourself not to? _____
17. Felt physically or psychologically dependent? _____
18. Was told by a friend, neighbor, or relative to stop or cut down your marijuana use? _____

Have any of the following things happened to you **WHILE YOU WERE USING MARIJUANA OR BECAUSE OF YOUR MARIJUANA USE** in the last six months? If you have not used marijuana in the past six months, check here. ☐

Please circle "Y" for YES and "N" for NO.

1. Not able to do your homework or study for a test? _____
2. Got into fights, acted bad or did mean things? _____
3. Missed out on other things because you spent too much money on marijuana? _____
4. Went to work or school high? _____
5. Caused shame or embarrassment to someone? _____
6. Neglected your responsibilities? _____
7. Friends, neighbors, or relatives avoided you? _____
8. Felt that you needed more than you used to use in order to get the same effect? _____
9. Tried to control your marijuana use by trying to use only at certain times of the day or in certain places? _____
10. Had withdrawal symptoms, (felt sick) because you stopped or cut down on marijuana? _____
11. Noticed a change in your personality? _____
12. Felt that you had a problem with marijuana? _____
13. Missed a day (or part of a day) of school or work? _____
14. Suddenly found yourself in a place that you could not remember getting to? _____
15. Passed out or fainted suddenly? _____
16. Kept using when you promised yourself not to? _____
17. Felt physically or psychologically dependent? _____
18. Was told by a friend, neighbor, or relative to stop or cut down your marijuana use? _____

APPENDIX E

Marijuana Motives Questionnaire

The following is a list of reasons people sometimes give for using marijuana. Thinking of all the times you use marijuana, **how often** would you say that you use marijuana for each of the following reasons? Note: If you used marijuana one or more times in the past, but do not use it now, mark the reasons that applied when you did use.

1=Almost never/never

4=Most of the time

2=Some of the time

5=Almost always/always

3=Half of the time

1. I use marijuana to forget my worries. _____
2. I use marijuana because my friends pressure me to use marijuana. _____
3. I use marijuana because it helps me enjoy a party. _____
4. I use marijuana because it helps me when I feel depressed or nervous. _____
5. I use marijuana to be sociable. _____
6. I use marijuana to cheer up when I am in a bad mood. _____
7. I use marijuana because I like the feeling. _____
8. I use marijuana so that others won't kid me about *not* using marijuana. _____
9. I use marijuana because it's exciting. _____
10. I use marijuana to get high. _____
11. I use marijuana because it makes social gatherings more fun. _____
12. I use marijuana to fit in with a group I like. _____
13. I use marijuana because it gives me a pleasant feeling. _____
14. I use marijuana because it improves parties and celebrations. _____
15. I use marijuana because I feel more self confident and sure of myself. _____
16. I use marijuana to celebrate a special occasion with friends. _____
17. I use marijuana to forget about my problems. _____
18. I use marijuana because it's fun. _____
19. I use marijuana to be liked. _____
20. I use marijuana so I won't feel left out. _____
21. I use marijuana so I can know myself better. _____
22. I use marijuana because it helps me be more creative and original. _____
23. I use marijuana so I can understand things differently. _____
24. I use marijuana so I can expand my awareness. _____
25. I use marijuana to be more open to experiences. _____

APPENDIX F

Marijuana Effect Expectancy Questionnaire (MEEQ)

The following pages contain statements about the effects of marijuana. Read each statement carefully and respond according to your own personal thoughts, feelings and beliefs about marijuana now. We are interested in what you think about marijuana, regardless of what other people might think.

WHETHER OR NOT YOU HAVE HAD ACTUAL MARIJUANA EXPERIENCES YOURSELF, you are to answer in terms of your beliefs about marijuana. It is important that you respond to every question. There are no right or wrong answers. Respond to these items according to what you personally believe to be true about a moderate amount of marijuana (however you define moderate).

1=Agree Strongly, 2=Agree Somewhat, 3=Uncertain, 4=Agree Somewhat, 5=Agree Strongly

1. Marijuana does not make me sleepy and tired. _____
2. Marijuana makes small things seem really interesting. _____
3. Smoking marijuana makes me hungry. _____
4. Marijuana gives me a mellow feeling. _____
5. Smoking marijuana increases my craving for things _____
6. I get a sense of relaxation from smoking marijuana. _____
7. Marijuana disrupts my attention and I get easily distracted. _____
8. Smoking marijuana makes me less tense or relieves anxiety;
it helps me to unwind. _____
9. Marijuana makes me carefree and I do not care about my problems
as much. _____
10. Smoking marijuana makes me feel agitated. _____
11. I am not concerned about how others evaluate me when I am on
marijuana. _____
12. Smoking marijuana makes me feel like hiding in a corner. _____
13. Marijuana makes me talk more than usual. _____
14. After smoking marijuana, I become more quiet and tend not to
socialize. _____
15. I feel like I can focus on one thing better when I smoke marijuana. _____
16. When I smoke marijuana I do not feel insecure. _____
17. I have a better time at parties if I am smoking marijuana. _____
18. Smoking marijuana does not make me thirsty. _____
19. Marijuana makes me say things I do not mean. _____
20. I am more sociable when I smoke marijuana. _____
21. Marijuana makes me paranoid. _____
22. Smoking marijuana makes me feel like part of the group. _____
23. If I have been smoking marijuana, it is harder for me to concentrate _____

- and understand the meaning of what is being said. _____
24. Marijuana slows thinking and actions. _____
25. I become more creative or imaginative on marijuana. _____
26. If I have been smoking marijuana it is harder to remember things. _____
27. Marijuana makes time seem to slow down. _____
28. I withdraw in social situations when I am on marijuana. _____
29. Marijuana does not cause you to think less clearly. _____
30. Marijuana makes reaction times slower. _____
31. Things seem unreal and I feel out of touch with what is going on around me when I smoke marijuana. _____
32. My eyes do not become red and sore when I smoke marijuana. _____
33. Marijuana does not change the way I view things. _____
34. When I smoke marijuana it changes my vision or can make me have hallucinations. _____
35. I feel warm when I smoke marijuana. _____
36. When I smoke marijuana it helps me escape reality. _____
37. Marijuana changes the way my body feels; for example, light-headedness, tingly or dizzy sensations. _____
38. Marijuana makes me giggly and laugh a lot. _____
39. When I smoke marijuana I feel like I have heavy feet and no coordination. _____
40. Marijuana does not cause lung problems. _____
41. Music sounds different when I smoke marijuana. _____
42. Marijuana tastes and smells bad. _____
43. Marijuana does not make me uninhibited (unrestrained). _____
44. I am more willing to do things that I normally would not do when I smoke marijuana. _____
45. Things seem funny and less serious to me when I smoke marijuana. _____
46. I have a happy, good feeling when I smoke marijuana. _____
47. Marijuana causes me to lose control and become careless. _____
48. Marijuana makes it easier to escape from problems and responsibilities. _____
49. Smoking marijuana causes me to act pretty much the same. _____
50. I am less motivated when I smoke marijuana. _____
51. Marijuana can cause me to become depressed and disappointed with myself. _____
52. Marijuana causes euphoria (strong sense of well-being). _____
53. Marijuana can make my feelings change from happy to sad. _____
54. I act excited when I smoke marijuana. _____
55. Smoking marijuana is similar to being "high" from drinking alcohol. _____
56. Marijuana does not make me feel more romantic or attracted to members of the opposite sex. _____
57. After smoking marijuana my eyelids feel heavy and I become drowsy. _____
58. Marijuana can make me angry and possibly violent. _____
59. After the "high" of smoking marijuana, I feel down. _____

60. Marijuana does not alter my personality. _____
61. I feel sexy or more interested in sex after smoking marijuana. _____
62. Marijuana impairs my functioning, especially in school. _____
63. Marijuana makes me critical and short-tempered. _____
64. I get the "munchies" (craving for snacks) when I smoke marijuana. _____
65. It is difficult for me to express my thoughts clearly if I have been smoking marijuana. _____
66. Marijuana makes my mouth seem dry. _____
67. Marijuana makes me calm. _____
68. Marijuana changes my perception of time and distance. _____
69. I become anxious or uneasy on marijuana. _____
70. I am more relaxed in social situations if I have been smoking marijuana. _____
71. Marijuana does not make me sleepy and tired. _____
72. Smoking marijuana makes me feel agitated. _____
73. I am more sociable when I smoke marijuana. _____
74. Marijuana makes reaction times slower. _____
75. Marijuana does not cause lung problems. _____
76. I am less motivated when I smoke marijuana. _____
77. Marijuana does not alter my personality. _____
78. I am more relaxed in social situations if I have been smoking marijuana. _____

APPENDIX G

Perceived Peer Marijuana Use Questions

Please answer the following questions about your social situation since coming to college.

1. How do most of your friends feel about using marijuana? _____
1=Strongly Disapprove
2=Disapprove
3=Neither Approve or Disapprove
4=Approve
5=Strongly Approve
2. How do most of your friends feel about getting stoned? _____
1=Strongly Disapprove
2=Disapprove
3=Neither Approve or Disapprove
4=Approve
5=Strongly Approve
3. How often (on average) do your close friends use marijuana? _____
1=Never or almost never
2=Occasionally
3=Only on weekends
4=Weekends and weekdays
5=Almost every night
4. How often does smoking marijuana go on where you live? _____
1=Never or almost never
2=Occasionally
3=Only on weekends
4=Weekends and weekdays
5=Almost every night
5. On the average, during the current school year, how often have you been to parties or other social gatherings where people were using marijuana? _____
1=Never or almost never
2=Occasionally
3=Only on weekends
4=Weekends and weekdays
5=Almost every night

6. How much pressure do you feel from your friends for you to use marijuana more than you want to? _____

1=None at all

2=A little pressure

3=A fair amount of pressure

APPENDIX H

Brief Symptom Inventory (BSI)

In this section is a list of problems people sometimes have. Please read each one carefully, and blacken the circle that best describes HOW MUCH THAT PROBLEM HAS DISTRESSED OR BOTHERED YOU DURING THE PAST 7 DAYS INCLUDING TODAY.

0	1	2	3	4
Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Nervousness or shakiness inside				_____
2. Faintness or dizziness				_____
3. The idea that someone else can control your thoughts				_____
4. Feeling others are to blame for most of your troubles				_____
5. Trouble remembering things				_____
6. Feeling easily annoyed or irritated				_____
7. Pains in heart or chest				_____
8. Feeling afraid in open spaces or on the streets				_____
9. Thoughts of ending your life				_____
10. Feeling that most people cannot be trusted				_____
11. Poor appetite				_____
12. Suddenly scared for no reason				_____
13. Temper outbursts that you could not control				_____
14. Feeling lonely even when you are with people				_____
15. Feeling blocked in getting things done				_____
16. Feeling lonely				_____
17. Feeling blue				_____
18. Feeling no interest in things				_____
19. Feeling fearful				_____
20. Your feelings being easily hurt				_____
21. Feeling that people are unfriendly or dislike you				_____
22. Feeling inferior to others				_____
23. Nausea or upset stomach				_____
24. Feeling that you are watched or talked about by others				_____
25. Trouble falling asleep				_____
26. Having to check and double-check what you do				_____
27. Difficulty making decisions				_____
28. Feeling afraid to travel on buses, subways, or trains				_____
29. Trouble getting your breath				_____
30. Hot or cold spells				_____
31. Having to avoid certain things, places, or activities because they frighten you				_____
32. Your mind going blank				_____
33. Numbness or tingling in parts of your body				_____

- 34. The idea that you should be punished for your sins _____
- 35. Feeling hopeless about the future _____
- 36. Trouble concentrating _____
- 37. Feeling weak in parts of your body _____
- 38. Feeling tense or keyed up _____
- 39. Thoughts of death or dying _____
- 40. Having urges to beat, injure, or harm someone _____
- 41. Having urges to break or smash things _____
- 42. Feeling very self-conscious with others _____
- 43. Feeling uneasy in crowds, such as shopping or at a movie _____
- 44. Never feeling close to another person _____
- 45. Spells of terror or panic _____
- 46. Getting into frequent arguments _____
- 47. Feeling nervous when you are left alone _____
- 48. Others not giving you proper credit for your achievements _____
- 49. Feeling so restless you couldn't sit still _____
- 50. Feelings of worthlessness _____
- 51. Feeling that people will take advantage of you if you let them _____
- 52. Feelings of guilt _____
- 53. The idea that something is wrong with your mind _____

APPENDIX I

Impulsive Sensation Seeking Scale (ImpSS)

DIRECTIONS: If you agree with a statement or decide that it describes you, answer TRUE. If you disagree with a statement or feel that it is not descriptive of you, answer FALSE. Answer every statement either True or False even if you are not entirely sure of your answer.

1. I tend to begin a new job without much advance planning on how I will do it. _____
2. I usually think about what I am going to do before doing it. _____
3. I often do things on impulse. _____
4. I very seldom spend much time on the details of planning ahead. _____
5. I like to have new and exciting experiences and sensations even if they are a little frightening. _____
6. Before I begin a complicated job, I make careful plans. _____
7. I would like to take off on a trip with no preplanned or definite routes or timetable. _____
8. I enjoy getting into new situations where you can't predict how things will turn out. _____
9. I like doing things just for the thrill of it. _____
10. I tend to change interests frequently. _____
11. I sometimes like to do things that are a little frightening. _____
12. I'll try anything once. _____
13. I would like the kind of life where one is on the move and traveling a lot, with lots of changes and excitement. _____
14. I sometimes do "crazy" things just for fun. _____
15. I like to explore a strange city or section of town by myself, even if it means getting lost. _____
16. I prefer friends who are excitingly unpredictable. _____
17. I often get so carried away by new and exciting things and ideas that I never think of possibly complications. _____
18. I am an impulsive person. _____
19. I like "wild" uninhibited parties. _____

APPENDIX J

NEO Five Factor Inventory (NEO-FFI)
(First half of questionnaire)

Read each of the following statements and answer each one with the number that best represents your opinion regarding whether you strongly disagree with it, disagree with it, are neutral about it, agree with it, or strongly agree with it. Place your answer in the space provided next to each statement.

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

1. I am not a worrier. _____
2. I like to have a lot of people around me. _____
3. I don't like to waste my time daydreaming. _____
4. I try to be courteous to everyone I meet. _____
5. I keep my belongings clean and neat. _____
6. I often feel inferior to others. _____
7. I laugh easily. _____
8. One I find the right way to do something, I stick to it. _____
9. I often get into arguments with my family and co-workers. _____
10. I'm pretty good about pacing myself so as to get things done on time. _____
11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces. _____
12. I don't consider myself especially "light-hearted". _____
13. I am intrigued by the patterns I find in art and nature. _____
14. Some people think I'm selfish and egotistical. _____
15. I am not a very methodical person. _____
16. I rarely feel lonely or blue. _____
17. I really enjoy talking to people. _____
18. I believe letting students hear controversial speakers can only confuse and mislead them. _____
19. I would rather cooperate with others than compete with them. _____
20. I try to perform all tasks assigned to me conscientiously. _____
21. I often feel tense and jittery. _____
22. I like to be where the action is. _____
23. Poetry has little or no effect on me. _____
24. I tend to be cynical and skeptical of others' intentions. _____
25. I have a clear set of goals and work toward them in an orderly fashion. _____
26. Sometimes I feel completely worthless. _____
27. I usually prefer to do things alone. _____
28. I often try new and foreign foods. _____
29. I believe that most people will take advantage of you if you let them. _____
30. I waste a lot of time before settling down to work. _____
31. I rarely feel fearful or anxious. _____

APPENDIX K

Frequency Tables for Use Questions

How many times in your lifetime have you used marijuana?

	Frequency	Percent
1-5 times	114	28.3
6-9 times	36	8.9
10-19 times	49	12.2
20-39 times	54	13.4
40-59 times	18	4.5
60-79 times	11	2.7
80-99 times	12	3.0
100 or more times	108	26.8
Missing Item	1	.2

How many times in the past 6 months have you used marijuana?

	Frequency	Percent
No use	136	33.7
Less than once a month but at least Once in the past 6 months	105	26.1
Once a month	19	4.7
2-3 times per month	51	12.7
Once or twice a week	14	3.5
3-4 times per day	28	6.9
Nearly every day	17	4.2
Once a day	4	1.0
More than once a day	28	6.9
Missing Item	1	.2

How many times in the past 30 days have you used marijuana?

	Frequency	Percent
No use	216	53.6
Once	51	12.7
Twice	18	4.5
Three times	30	7.4
Once a week	11	2.7
2-3 times a week	14	3.5
4-6 times a week	18	4.5
Once a day	13	3.2
More than once a day	31	7.7
Missing Item	1	.2