### UNIVERSITY OF CALGARY

Drug Use: Initiation and Progression

by

Kelly Moroz

## A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

## IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

## THE DEGREE OF MASTER OF SCIENCE

## DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

CALGARY, ALBERTA

JULY, 2000

©Kelly Moroz 2000



National Library of Canada

Acquisitions and Bibliographic Services

395 Wellington Street Ottawa ON K1A 0N4 Canada Bibliothèque nationale du Canada

Acquisitions et services bibliographiques

395, rue Wellington Ottawa ON K1A 0N4 Canada

Your file Votre reférence

Our file Notre rélérence

The author has granted a nonexclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission. L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-55227-6

# Canadä

ABSTRACT

Drug use, on the rise again among teens and young adults, has been found to be acquired in a series of stages. Two hundred and fifty adult volunteers (158 men and 89 women), between the ages of 18 and 45 (M=24.7, SD=6.48) were obtained from the University of Calgary, downtown Calgary, and the Calgary Remand Centre to fill out questionnaires for the present study. Congruent with research over the past 25 years, Chisquare analysis determined that drug use occurred in the order of alcohol, cigarettes, marijuana, and hard drugs. Hard drug use was typically initiated with hallucinogens and amphetamines, whose properties of euphoria, togetherness, and energy to dance all night are desired at the newly popularized rave scene. Cocaine experimentation followed in young adulthood. This use was cumulative, meaning that drugs abused previously were used in conjunction with drugs of more recent experimentation. Factors previously related to further progression through the model have included frequent use of gateway drugs and earlier ages of experimentation with substances. There was no evidence that increased gateway drug use led to further progression. Rather, increased use of alcohol, cigarettes, and marijuana followed use of the hard drugs.

A three-way Multivariate Analysis of Variance (MANOVA) determined that earlier initiation to substances (usually alcohol) was related to an increased repertoire of drugs, a greater intensity of drug use (past and current), and a greater number of drug-related life problems. As further determined through post hoc analysis using the Scheffe method, subjects that delayed experimentation with substances past the age of fifteen were

iii

significantly less likely to be plagued by heavy involvement with alcohol and drugs. Prevention measures related to delaying the onset of substance use are discussed.

#### ACKNOWLEDGMENTS

I would like to thank my supervisor, Dr. Lauren Sandals, for his invaluable guidance throughout the course of this research project. His high research standards are truly special. Thanks also to Tak Fung for aiding in the analysis and interpretation of results.

I am further grateful to Dr. Robert Williams, whose background in substance abuse research greatly aided in questionnaire construction and research methodology, and to Dr. Victor Grossi, for his guidance in sample selection. I am further indebted to the store owners the Ship and Anchor Pub, Divine Decadence, Feroshus, Grassroots, and the Hemporium, as well as the University of Calgary Student's Union, the Mackimmie Library, and the Calgary Remand Centre for permitting me to place questionnaire racks in their locations. This study would not have been possible without this generosity.

I would like to express special thanks to my parents, Reginald and Geraldine Moroz, my grandparents, Joseph and Pauline Sawchuck, and to my Uncle Stanley. These family members have not only stressed the value of good education, but have believed in me and supported my studies all these years. Their faith, love, and giving nature will never be forgotten.

Last, but not least, I am grateful to my friends, both in Winnipeg and Calgary. Thank you for always being there for me.

v

Approval Page	ii		
Abstract			
Acknowledgments			
Table of Contents			
List of Tables	ix		
List of Figures			
CHAPTER ONE INTRODUCTION	1		
The Problem	1		
Purpose and Rationale of the Current Study	3		
Hypotheses	4		
Other Research Questions			
Further Rationale	т 5		
Delimitations of the Study	6		
Limitations of the Study	6		
	0		
CHAPTER TWO: LITERATURE REVIEW	10		
Drug-related Problems	10		
The Gateway Hypothesis	11		
The Typical Progression	13		
Drug Roles and Positioning	14		
Alcohol	14		
Cigarettes	15		
Marijuana	17		
Inhalants	18		
The Harder Drugs	19		
Hallucinogens	19		
Phencyclidine	21		
Cocaine	21		
Crack Cocaine	22		
Opiates	22		
Prescription Opiates	23		
Tranquilizers	23		
Amphetamines and Methamphetamines.	24		
Hard Drug Sequencing.	24		
Gender Differences	26		
Drug Cumulativeness	27		
Precursors to Progression	29		
Age of Initiation to Drugs.	29		
Frequency/Intensity of Substance Use	31		

## TABLE OF CONTENTS

.

.

CHAPTER 3: METHODOLOGY	32
Sample	32
Questionnaire Development	35
Measure of Drug-Related Life Problems	35
Tracking Drug Use Chronologically	36
Diversity Issues	37
Scoring	37
Procedure	38
Analysis	40
Drug Use Patterning	40
Age of Initiation and Usage Progression/DAST Scores	42
Drug Cumulativeness	42
Problematic or Frequent Use	43
Ethical Standards	43
	75
CHAPTER 4 RESULTS	45
Drug Use Patterning	47 47
Age of Initiation to Drugs	51
Drug Cumulativeness	58
Frequency/Intensity of Drug Lise	58
Educational Levels	60
Hard Drug Positioning	65
	05
CHAPTER 5 DISCUSSION	60
Summary	69
Drug Use Patterning	69
Age of Initiation to Drugs	73
Drug Cumulativeness	76
Frequency/Intensity of Drug Lise	77
Educational Levels	77
Hard Drug Positioning	70
Implications and Future Directions	80
Conclusions	82
Conclusions	0)
REFERENCES	85
	05
APPENDIX A: The Drug Abuse Screening Test	94
APPENDIX B: Questionnaires #2 and #3	95
APPENDIX C: Poster for Soliciting Volunteers	99
APPENDIX D: Cover Letter for Downtown Volunteers	100

APPENDIX E: Cover Letter for Inmate Volunteers	101
APPENDIX F: Cover Letter for University Volunteers	102
APPENDIX G: Consent Form	103

## LIST OF TABLES

Table 1:	Demographic Data for Participants	33
Table 2:	Use of Individual Drugs by Gender	46
Table 3:	Chi Square Analysis of Drug Patterning (Legal, Marijuana, Hard)	48
Table 4:	Chi Square Analysis of Drug Patterning (Alcohol, Cigarettes, MJ)	50
Table 5:	Drugs of Abuse: Prevalences, Order Tried, Age of First Experimentation,	,
	and Frequency that Use was Preceded by Other Drugs	53
Table 6:	Dependent Variable Comparisons Across Age of Drug Initiation	55
Table 7:	Univariate F and p Values and Scheffe Post Hoc Significances for	
	Differences Between Initiation Groups	57
Table 8:	Chi Square Analysis of Cumulative Versus Non-Cumulative Use	59
Table 9:	Chi Square Analysis of High Intensity Alcohol Use	59
Table 10	: Chi Square Analysis of High Intensity Cigarette Use	61
Table 11	: Chi Square Analysis of High Intensity Alcohol Use	61
Table 12	: Dependent Variable Comparisons Across Educational Level Attained	61
Table 13	: Univariate F and p Values and Scheffe Post Hoc Significances for	
	Differences Between Educational Backgrounds	64
Table 14	: Chi Square Analysis of Hard Drug Ordering	66
Table 15	: Amount of Total Hard Drug Use that is Initiated Before a Fourth Hard	
	Drug is Used	66

.

## LIST OF FIGURES

Figure 1:	Ages of Participants	34
Figure 2:	Time-line Flowchart	41
Figure 3:	Prevalence Rates (%) of Experimentation with Various Drugs	46
Figure 4:	Trends in Legal, Marijuana, and Hard Drug Use	48
Figure 5:	Trends in Alcohol, Cigarettes, and Marijuana Patterning	50
Figure 6:	Age of First Experimentation with Drugs	54
Figure 7:	Prevalence Rates for First, Second, and Third Hard Drug Use Among	
	Various Cohorts	68

-

#### **CHAPTER 1: INTRODUCTION**

Heavy alcohol and drug use is associated with serious pubic health and safety problems at all levels of society, showing up in the form of traffic accidents, a disproportionate use of medical/social services, and violence (Rice, Kelman, & Miller, 1991). After peaking in the late 1970's, prevalences of alcohol and drug use among Canadian and American high school seniors decreased annually until 1992. Between 1992 and 1998, however, annual prevalences were on the rise again (Mash & Barkley, 1998; Hindmarsh, Porter-Serviss, & Opheim, 1994; Canada's Drug Strategy, 1998) with twice as many adolescents initiating drug use in 1998, compared to the early 1990's. Though such initiation rates have leveled off since 1998, rates of drug use among *young* people are a cause for concern.

Not only has the use of drugs increased dramatically, but, with the popularization of the rave scene, the major customer has shifted to the young (Emmett & Nice, 1996). This recent emergence of the rave scene (all-night dance parties that cater to adolescents and young adults) in recent years has helped popularize different categories of hard drugs. Hallucinogens and amphetamines provide youth with enough energy to dance for hours on end, and contribute to feelings of euphoria and togetherness. Of the eightyeight people interviewed at a recent rave in Australia, over half the patrons had used cannabis that evening, while over one third had used amphetamines and hallucinogens (Lenton, Boys, & Norcross, 1997). Though treatment of drug addicts is a necessary service, many addicts will never overcome their addictions. Stressing the prevention of attaining these higher levels of drug involvement and addiction, it would be worthwhile to investigate the entire spectrum of drug use progression (abstinence, experimentation, regular use, and full blown addiction).

Much of the research on drug use began in the 1960's, as the abuse of heroin rose substantially. A connection was found between marijuana and later heroin use (Welte & Barnes, 1985). Ball (1967), for example, found that 80% of heroin users in his sample had previously used marijuana, with marijuana use initiating at 16 or 17, followed by heroin at 18. Kandel (1975), however, in proposing *her* sequential model of drug use progression, recognized alcohol as a necessary first step in the model, preceding marijuana use. Early research employed a stage-like model, whereby drug use progressed in the following order: non-use, legal drugs (alcohol or cigarettes), cannabis, pills, psychedelics, cocaine, and heroin (Kandel & Faust, 1975).

Because the positioning of drugs later in the sequence (e.g., psychedelics, cocaine, and heroin) are effected by the era, availability, and trendiness of these drugs, subsequent research has collapsed these drugs into one category (hard drugs). This presents a model consisting of stages in the following order: non-use, alcohol use, cigarette use, marijuana use, and hard drug use (amphetamines, barbiturates, LSD, cocaine, and heroin) (Blaze-Temple & Sing, 1992). Alcohol, nicotine, and marijuana, drugs that are less often associated with serious threats to one's well being, may be the gateway to later, more problematic usage behaviours. Kandel (1975) also speculated that typical drug use patterns are cumulative. Drugs more recently experimented with are likely used in conjunction with drugs used in the past. A marijuana smoker is therefore likely to be a regular drinker and cigarette smoker.

Though the model covers up to the highest intensities of drug use, few users will actually reach these levels. Rather, those who do reach these levels will likely have followed a progression from legal to illegal drug use. A stage-like model of drug use would be more helpful if it determined causal factors related to progression through the sequence (which factors relate to differential levels of drug involvement). The age of onset of legal drug use (likely alcohol) appears related to further progression and addiction (Yamaguchi & Kandel, 1984). Though other factors may certainly be responsible for the adolescent's decision to drink at an early age, those that do begin using legal drugs at early ages are more likely to progress further through the model. Kandel and Yamaguchi (1993), using a sample of grade twelve students in New York, found that those students that progressed to cocaine and crack use began drinking alcohol, smoking cigarettes, and using marijuana two years earlier, on average, than those who did not go on to use cocaine. The *early* onset of legal drugs correlated with higher levels of lifetime drug use.

#### Purpose and Rationale of the Current Study

Because drug progression models are based on the idea that current use is predicted by drug use in the past, this study permitted investigation of this concept through

3

retrospective examination. Adults indicated drugs that they currently or previously used, the ages when they first tried particular drugs, and the frequency with which they used each drug. This provided a chronologically sound account of lifetime drug use patterning and progression.

#### HYPOTHESES

Past research permitted the generating of a number of hypotheses for the present study:

- Drug use will follow a stage-like pattern. That is, the present Calgary sample will indicate a lifetime pattern akin to past studies (i.e., Kandel et al., 1992) in which legal drugs (alcohol and cigarettes) preceded the use of marijuana, which in turn preceded the use of hard drugs (hallucinogens, PCP, amphetamines, tranquilizers, opiates, cocaine, and prescription opiates).
- 2. Age of initiation to alcohol (or whichever the drug of first experimentation was) will have a strong negative relationship with drug use indices, such that the earlier in life one begins using alcohol/drugs, the greater the chance that he/she will use more drugs (and to a greater intensity) and face more drug-related life problems. Another benefit of the study will be to address issues that have not provided conclusive

answers in past research. These include:

 A closer examination of the cumulative nature of drug use. Past research (i.e., Kandel & Faust, 1975; Donovan & Jessor, 1983) has speculated that users continue using drugs from the past, while experimenting with new ones (e.g., cocaine users continue using marijuana, cigarettes, and alcohol, in addition to cocaine).

- 4. Frequency/intensity of use as a precursor to further progression. Ravies and Kandel (1987), among others, have examined frequent use of gateway drugs (alcohol, cigarettes, and marijuana), finding that such use was related to further progression through the model. At least two studies (Donovan & Jessor, 1983; Elickson, Hays, & Bell, 1992) have argued that increased gateway use constitutes separate and distinct stages in the model, preceding hard drug use.
- 5. An examination of the effects of gender and education level on usage indices.
- The current ordering of hard drugs in Calgary, a concept that is determined significantly by the era, availability, and trendiness of particular hard drugs (Segal, 1986).

If *earlier* initiation to *legal* drugs act as a "gateway" to later illicit drug use, then a number of implications can be drawn towards hard usage progression. Specifically, delaying the initiation of legal drug use could prevent use of the harder drugs. Efforts to delay this initiation must then be examined in greater detail.

#### **Delimitations of the Study**

The results of this study can only be generalized to adults living within Calgary, Alberta, Canada. The results cannot completely be generalized to the rest of the nation, as location may factor in the accessibility, popularity, and risk (stance of law enforcement on drug usage, purity of various hard drugs, etc.) of using certain drugs.

1. Calgary liquor stores are open seven days a week, compared to Manitoba, where liquor stores are closed on Sundays. The privatization of Albertan liquor stores may further promote the availability of alcohol to younger youth, as mandatory checking for identification may be more relaxed in a profit-driven private business. Furthermore, the legal drinking age is lower in Alberta than most Canadian provinces (18 is the legal drinking age in only Manitoba, Quebec, and Alberta; it is 19 in all other provinces) and the United States (drinking age is 21), providing legal access to alcohol one to three years in advance of American (and most other Canadian) youth.

2. Codeine products, such as Tylenol, 222's, and cough medicines are available over-thecounter drugs to Canadians of all ages. The United States of America requires a medical prescription to attain these substances.

#### Limitations of the Study

1. In order to make comparisons across the different ages of initiation to alcohol/drugs, subjects were grouped (into four groups) depending on the age which they initiated drug use. In contrast to the university sample (which contained a much higher proportion of post secondary participants than would be expected from the population at large),

subjects solicited from a local jail (the Calgary Remand Centre), drug paraphernalia stores, and places where users congregate (pubs, inner city parks) ensured the inclusion of those that had progressed to harder drugs. This was important for ensuring equal group representativeness in later analysis, but the sample may not be representative of the entire population (it ensured population extremes; abstainers and heavy users).

2. Limitations surrounding the sampling procedure and the obtained sample may have influenced the results:

a) There was a gender discrepancy, in that nearly twice as many males as females returned completed questionnaires (158 men, 89 women). As the Calgary Remand Centre only houses men, all 30 participants solicited from this location were males. Though other locations permitted an equal number of men and women to participate, males still returned more questionnaires than females. As males use more drugs, on average, than females, the sample may overestimate drug involvement and drug-related life problems in the Calgary population.

b) Due to the wide discrepancies in the ages of individual participants (18-45), younger participants (on average) were unlikely to have sampled as many drugs or to have attended university/community college as older subjects.

c) This was a non-random sample, in that a number of personal factors may have contributed to which people filled out questionnaires. These factors include:

i) Motivation to participate (e.g., people that were willing to disclose their drug use histories; likely includes those who felt that the study was more relevant to their lifestyle, such as heavy substance abusers).

ii) Having the time to complete a 15-20 minute questionnaire (e.g., this may have biased the sample in favour of those with more free time (e.g., the unemployed, students with fewer course requirements/time dedicated to school work).

3. Retrospective studies of this sort require memory, and are subject to distortions. While adolescent self-report of substance use tends to be reasonably reliable and valid (Smith, McCarthy, and Goldman, 1995), memory distortions are magnified the further away the incident in question is recalled. Though most of the sample fell into the 18-30age range, a few subjects were over the age of 40. Current substance use appears to influence retrospective reporting, such that retrospective reporting conforms to current levels of substance use (e.g., subjects that currently use higher levels of substances report exaggerate retrospective levels of substance use) (Czarnecki, Russel, and Sattler, 1990). 4. Questioning of this sort is extremely personal, and participants may have felt threatened to share such a private matter. Despite assured anonymity (e.g., through selfadministered questionnaires, questionnaires filled out privately at the leisure of the participant), it is difficult to speculate the reactions to such questioning, and subjects may have distorted answers out of shame or concern for confidentiality breaches. Underreporting of substance use is more common for less socially acceptable drugs (Lundy et al., 1997).

5. Due to anonymity precautions, the researcher could not ensure that subjects could read or clearly understand all questions. This is particularly relevant in considering when

particular substances were initiated. Though most participants were likely to report "first use" of particular substances as the time when they first experimented with them, it is conceivable that the "alcohol" category was deemed "first used" when the subject first experienced being intoxicated.

6. There was some expressed concern over a couple of drug categories. MDMA (Ecstasy) was put under the category of hallucinogens, though it is a form of amphetamine with hallucinogenic properties. Though a number of participants commented that Ecstasy should have fallen under the "amphetamine category," most texts (including the DSM IV, 1992) refer to Ecstasy as a hallucinogenic. Other concerns revolve around the "prescription opiates" category, as some participants appeared to confuse prescribed use of these drugs with recreational abuse (such as using an inhaler for asthma).

#### CHAPTER TWO

#### LITERATURE REVIEW

Prior to the 1970's, adolescent substance abuse consisted mainly of alcohol and cigarettes. The late 1960's and early 1970's saw an increased acceptance of other drugs (particularly marijuana), resulting in increased availability and problematic misuse (Mash & Barkley, 1998). Increased use of psychoactive substances during this period may be due in part to a number of influences operating at the time. Aldous Huxley's "The Doors of Perception," a mid 1950's cult-classic book, described how mescaline allowed Huxley, in an experiment on his own consciousness, to view the world through pristine eyes (Zimbardo, 1992). Along with psychedelic music influences, college students of the 1960's were further intrigued by Timothy Leary and Carlos Casteneda. Leary, a former Harvard professor, popularized the phrase 'turn on, tune in, drop out" in an era that reflected youthful rebellion against authority. Leary's publications such as "The Psychedelic Experience" and "The Politics of Ecstacsy,"expounded the virtues of taking LSD as a vehicle for personal growth. Similar to Huxley, Carlos Castenada described how the use of drugs facilitated the transformation of his consciousness (Williams, 2000).

Partly attributable to the worldwide emergence of the rave scene (Hindmarsh at al., 1994), substance use among adolescents is prevalent, and represents an immense societal danger. Approximately 27% of Canadian drug users experience annual personal harm from their use, with the highest proportion of difficulties surrounding physical health,

10

outlook on life, studies/employment, financial position, and friendships (Canada's Alcohol and Other Drugs Survey, 1994).

Such alcohol and drug-related problems not only reduce the safety and quality of life, but are a source of substantial economic expense. The costs of alcohol and illicit drugs to Canadian society in 1992 was estimated at \$7.52 billion for alcohol, and \$1.37 billion for illicit drugs (Canada's Dug Strategy, 1998), taking the form of degrading neighborhoods, increased health costs (from increased accidents and accidental overdoses), and employment costs (income lost due to reduced productivity, increased absenteeism, and increased unemployment) (Saffer & Chaloupka, 1995). Substancerelated absenteeism costs Alberta approximately \$400 million each year, while alcohol involvement may be a factor in up to 30% of hospital admissions (Alberta Alcohol and Drug Abuse Commission, 1996).

The power of addiction is evident in the inability at curbing such behaviours in the face of disastrous consequences for continued personal use. This is exemplified by the number of infants exposed to drugs in utero, intravenous drug use in the face of the AIDS epidemic, and the strong relationship between drug use and later psychiatric illness (Brady, Casto, Lydiard, & Malcolm, 1998).

#### The Gateway Hypothesis

Much of the drug prevention research began in the 1960's, as heroin use became predominant. According to Welte and Barnes (1985), the "stepping stone" theory of drug progression was first widely publicized by the Federal Bureau of Narcotics (FBN) in 1965. The FBN, in an attempt to dissuade marijuana legalization, labeled marijuana as the "dangerous first step" in the progression to heroin use. The stepping stone theory proposed that once someone had used marijuana, he/she would inexorably proceed to using heroin. Subsequent research, however, found that most marijuana users did not in fact proceed to heroin use (Kandel, 1999).

The "gateway theory" of drug use proposes that there is a regular progression of involvement in drugs. A person who has used a drug at a lower level of the model has a greater probability of using drug(s) at the next level, but it is not certain that they will do so. Kandel and Faust (1975) developed a stage-like model of drug use. Drug use consisted of the various stages: 1) no use of any substance, 2) legal drugs (alcohol or tobacco), 3) cannabis, 4) psychedelics, 5) cocaine, and 6) heroin.

This pattern was deemed relatively invariant, and those who retrogressed through the sequence (ceased use) followed the reverse pattern (Kandel & Faust, 1975). The model concentrated on sequentially and hierarchically ordering the use of various drugs, but did not imply temporal order or causation (Blaze-Temple & Sing, 1992). Few drug users proceed to a narticular stage without first trying the previous stage. Kandel and Faust (1975), in two longitudinal studies in New York high schools, found that only 1% of nonusers went directly to illegal drug use without first experimenting with alcohol or cigarettes. Further, while twenty-six percent of marijuana smokers progressed to another illicit drug (most often pills, amphetamines, tranquilizers, and barbiturates), only 2% of non-marijuana smokers went on to use hard drugs.

Likely because efforts at lower stage are crucial to preventative efforts, more recent research has dissected the earlier stages of the model. Furthermore, the prevalence rates and progression patterning of harder drugs are more effected by the era, trendiness and availability of such drugs. Current research thus employs the following stages: 1) non-use, 2) alcohol use, 3) cigarette use, 4) marijuana-hashish use, and 5) hard use (amphetamines, tranquilizers, hallucinogens, cocaine, opiates, and PCP). Inhalants, prescription opiates, and cigarettes (occasionally), all legally obtainable drugs, have been more difficult to place in the sequence, and their individual roles have yet to be fully recognized.

#### The Typical Progression

The typical progression (abstinence-alcohol-cigarette-cannabis-hard drugs) has predominantly been studied in the New York area of the United States, using longitudinal or cross-sectional measures (i.e., Kandel, 1975; Kandel & Faust, 1975). Though more research in other geographic areas and across demographics is needed, the model has satisfactorily included most age groups (Andrews, Hops, Ary, and Lichenstein, 1991; Yu and Williford, 1991; Kandel, Yamaguchi, & Chen, 1992) participants from the countries of Israel and France (Adler & Kandel, 1981) and both genders (Windle, Barnes, & Welte, 1989).

Though no direct studies have tested this pattern on Canadian youth, Health Canada (1994) gave reason to speculate that such a developmental sequence is likely. Among Canadians, seventy-five percent of lifetime alcohol abstainers had never smoked and 98.8% of alcohol abstainers had never used marijuana. Furthermore, while 16.3% of Canadian smokers had tried cannabis, only 4% of non-smokers tried cannabis. Fewer alcohol abstainers than cigarette abstainers, therefore, have tried marijuana, implicating cigarettes as a separate stage between alcohol use and marijuana use.

#### Alcohol: It's Role and Position

A common perception is that alcohol, nicotine, and marijuana pose little serious threats to one's well being. Nonetheless, each drug warrants reasons for concern, particularly with lengthy repeated use.

#### Alcohol

The Alberta Alcohol and Drug Abuse Commission (1996) found that in 1995, 76% of Albertans 15 years and older were drinkers. Primary reasons for drinking include being more sociable (69%), to feel good (42%), to relax (39%), to enjoy meals (32%), and to be less shy (32%) (Canada's Drug Strategy, 1989). Alcohol has consistently been associated with severe violent offences, and two thirds of Canadian men and women who commit sexual assault or murder (to people other than a spouse) have been drinking.

Withdrawal symptoms from prolonged alcohol use may be quite severe, particularly in the unfortunate form of Delirium Tremens, characterized by severe agitation, extreme disorientation, high body temperatures, and terrifying hallucinations. Physical damage from prolonged abuse includes ulcers, liver diseases, damage to the heart muscle, high blood pressure, and reduced defenses against infectious diseases. Korsakoff's psychosis, a condition characterized by memory impairment, confusion, disorientation, and poor coordination, is caused by a combination of poor eating habits (nutritional deficiency) and the toxic effects of alcohol (AADAC, 1996).

Over 90% of high-school students use alcohol, and nearly every study on usage progression has determined that alcohol use is a necessary step for progression to later marijuana use. Exceptions include Keyes and Block (1984), who, using a small San Francisco sample (n=105), found that nearly twice as many adolescents initiated their drug use with marijuana, as opposed to alcohol.

Golub and Johnson (1994), in their study of 1003 *serious* Manhattan drug users, found that an equal proportion of youths began the sequence with marijuana as alcohol. Ninety percent of serious hard drug users in this study indicated prior marijuana use, while only 75% reported prior alcohol use. Though 90% of students who used "alcohol only" in their first year of drug use eventually initiated marijuana use, only 54% of those that used "marijuana only" in their first year eventually initiated alcohol. These findings were interpreted as differences in the developmental pathways of serious drug users and the general population (alcohol was less important in the progression to marijuana in serious users). Furthermore, with the increased availability and prevalence of marijuana since the 1960's, these authors rationed that the importance of alcohol as a gateway to marijuana appears to have declined, while marijuana's role as a gateway to hard drug use appears to have increased.

#### **Cigarettes: Role and Position**

Between 90% and 95% of all lung cancers are caused by smoking (AADAC, 1996).

Cigarette initiation often leads to dependence, with intense withdrawal symptoms (including craving, erratic emotions, nervousness/agitation, drowsiness, and impaired concentration) (Milkman & Sunderwirth, 1987). Thirty-five to fifty percent of young people who try even a few cigarettes become regular users, a process that takes two to three years following experimentation (Elders, Perry, Eriksen, and Giovino, 1994). Of those that try to stop smoking, 80% will be unsuccessful in a given year.

The majority of progression models have placed cigarettes between alcohol and marijuana. Generally, the effects of alcohol and cigarette smoking are additive in their predictive power of later marijuana use (Andrews et al., 1991; Yu & Williford 1992; Kandel & Yamaguchi, 1993), with the cumulative use of alcohol and cigarettes predicting later marijuana use significantly better than either substance alone. Kandel and Faust (1975) exemplified this with a large sample of high-school students. Twentyseven percent of students that used both alcohol *and* cigarettes eventually initiated marijuana smoking, a proportion equivalent to the sum of exclusive cigarette smokers (16%) and exclusive hard liquor users (11%) that later initiated marijuana smoking.

The few exceptions to typical drug patterning include studies that have found cigarette smoking to predict later hard drug use better than alcohol use (Newcomb & Bentler, 1986; Blaze-Temple et al., 1992; Flemming, Leventhal, Glynn, and Ershler, 1989). These studies have rationed that because so many people drink alcohol, alcohol use is a stable behaviour in itself, bearing little predictive power on later illicit drug use. At the other extreme, Welte and Barnes (1985), using over 20,000 New York subjects (grades 7-12) found a progression in use from alcohol to marijuana, to pills to hard drugs, with cigarettes failing to occupy a distinct position. Yu and Williford (1994) found that though cigarette smoking did constitute a separate stage in the model, it did not predict hard drug use any better than alcohol, at the preceding level. The authors speculated that the effect of cigarette smoking on other deviant behaviors (including illicit drug use) is short lived, as cigarette smoking is less deviant in adulthood than excessive alcohol, marijuana, or cocaine use.

Kandel et al. (1992) found gender differences in the gateway roles of alcohol and cigarettes. For men, cigarette smoking added very little to the predictive power of alcohol on later marijuana smoking. For women, however, smoking, even in the absence of alcohol initiation, generally preceded marijuana. These findings were later replicated by Kandel and Yamaguchi (1993) (93.4% of males followed the alcohol-marijuana sequence, while 92.4% of women followed an alcohol-cigarettes-marijuana pattern).

#### Marijuana: Role and Sequencing

Relaxation, happiness, congeniality, increased powers of concentration, sexual arousal, loss of inhibitions, warmth, increased appetite, and talkativeness are common motivations for marijuana use (Emmett et al., 1996), and marijuana use is the number one addiction among adolescents (Williams, 2000). Though severe adverse reactions to marijuana are rare, prolonged marijuana use has serious effects on adolescents' school performance. Long-term physical detrimental effects are similar to those of nicotine, factoring into the development of lung cancer. Sridhar, Raub, Weatherby, and Metsch (1994), in their examination of lung cancer patients, found that all of the youngest lung cancer patients in their study were marijuana smokers. It was discussed that even lower amounts of marijuana smoke may be harmful, as marijuana smoke contains 50-70% more carcinogenic hydrocarbons than cigarette smoke.

Approximately 16% of more frequent marijuana smokers (daily use for approximately 70 months) report experiencing marijuana withdrawal, usually within 24 hours of abstinence (Wiesbeck, Schuckit, Kalmijn, & Tipp, 1996). Such subjects typically report nervousness, sleep disturbances, and appetite change, while occasionally experiencing symptoms of nausea, tremors, sweating, or diarrhea.

The importance of marijuana on progression to harder drugs is clear. Marijuana users are significantly more likely to use cocaine, amphetamines, tranquilizers, opiates, and prescription opiates than non-marijuana smokers. The cumulative use of alcohol, cigarettes, and marijuana has been found to best predict later hard drug use (i.e., Andrews et al., 1990; Wiesbeck et al., 1996).

#### Inhalants

Inhalants abuse among elementary students became an epidemic in the early 1980's. People use inhalants (adhesives, lighter fluids, spray paints, cleaning fluids, and typewriter correction fluid) because of the quick high (similar high to being drunk), they are easily, cheaply and legally obtainable, and most products can be carried around in public without arising much suspicion (Gorny, 1994).

Though brain damage is a rarity with occasional inhalant abuse, prolonged use can

lead to permanent speech (slurred) and balance deficits (Emmett et al., 1996). Sudden inhalant death, an alarming tragedy over the last three decades, is caused by over stimulation of the heart following inhalant use. Further, many users suffer injury or death while being too intoxicated to control their actions (e.g., suffocating themselves with the plastic bag they used to inhale out of) (Gorny, 1994). Inhalants, likely because they are associated with lower socioeconomic classes, have been given only marginal attention in drug abuse research (Dinwiddie, 1994).

Schuetz, Chilcoat, and Anthony (1994) gave reason to consider solvent use a major risk factor for usage progression. After adjustment for sex, age, race, SES, and marijuana use (n=9259), inhalant users were 5.35 times more likely than non-users to have used intravenous drugs.

#### **The Harder Drugs**

#### Hallucinogens

Previously associated with the 1960's, Ecstasy and Lysergic Acid Diethylamide (LSD), have experienced a resurgence in popularity among youth. Used particularly at all night dance parties (raves), hallucinogens attract users with their chemical visionary state, euphoric highs, and sensory intensifications.

LSD (acid), recognized as the most powerful of the known hallucinogens, can create visual, auditory, and tactile hallucinations. Though there is no potential for overdose and little withdrawal effects associated with their use, risks lie in being involved in an accident while hallucinating, re-experiencing hallucinations at inopportune times

(flashbacks), and triggering latent psychiatric disorders (Emmett & Nice, 1996). Many people have reported experiencing flashback episodes for five years or longer following experimentation, often triggered by anxiety/fatigue, various drugs, entry into a dark environment, or other stressors (DSM IV, 1992).

Psilocybin (magic mushrooms) are the most widely used of the hallucinogens in Canada, and over half of all hallucinogen users only use mushrooms (Thompson, Anglin, Emboden, & Fisher, 1985). Though relatively weaker in hallucinogenic properties, Psilocybin attracts users with feelings of euphoria, high spirits, and bouts of laughter/giggling. Though overdose is a rarity and there are little withdrawal features, the real danger lies in consuming a poisonous mushroom by mistake (Emmett & Nice., 1996). Psilocybin has been known to induce flashbacks (akin to LSD) as well as psychotic states.

MDMA (Ecstasy), though low in hallucinogenic properties, attracts users with feelings of euphoria, heightened sociability, empathy, sexual arousal, and feelings of warmth/love to those around the user. Withdrawal effects of ecstasy include depression and anxiety. Some users report a hangover effect the day following MDMA use, characterized by insomnia, fatigue, drowsiness, sore jaw muscles from teeth clenching, loss of balance, and headaches (DSM IV, 1992). Disturbingly, MDMA has the distinction of being a neurotoxin, and is the only recreational drug known to destroy brain cells (Williams, 2000). Sudden adverse reactions to MDMA has resulted in a number of recent fatalities across Canada. Likely due to small clots in the blood system, and the raising of the body's temperature while, at the same time, becoming dehydrated, these fatalities have occurred in even experienced MDMA users.

#### Phencyclidine (PCP, angel dust)

Though sharing some of the properties with the hallucinogens, PCP is sufficiently different to be considered a separate identity. PCP produces a strange dissociative reaction, making the user insensitive to pain, and feeling a floating sensation, apart from surroundings (Zimbardo, 1992). Common problems encountered while on PCP include confusion, memory loss, and decreased concentration, while other known adverse reactions include unpredictable behaviour, fighting, immobility, mutism, hallucinations/delusions, and coma (Milkman & Sunderwirth, 1987). Though low in tolerance and withdrawal symptoms, PCP use may continue despite the presence of psychological/medical problems that the individual knows are caused by the substance (DSM IV, 1992).

#### Cocaine

The three major effects that cocaine users seek include increased self-confidence, greater energy and hyper-alertness, and euphoric mood alterations (Zimbardo, 1992). Heavy users, however, may experience paranoid delusions (beliefs that others are out to get them) and frightening hallucinations. A severe danger with cocaine is the contrast between the euphoric highs and the agitated depressive lows. Relief from such lows leads users to uncontrollably increase the frequency of drug use and dosage, factoring into a high potential for overdose and health problems related to deterioration of the nasal passage.

**Crack,** a form of cocaine treated chemically so that it vaporizes at a lower temperature, has been involved in the most recent US drug epidemic. The immediate high from smoking crack is intensely powerful, with feelings of extreme elation, power, strength, and well being. This wears off in between 5 and 20 minutes, leaving an even more intense feeling of depression than regular cocaine (Oetting, Beauvais, & Edwards, 1989). Violence is probable (as is suicide) when the agitated user goes through withdrawal of the drug, and its addiction potential is so great that users frequently prostitute themselves in exchange for the drug (Edlin, Irwin, Faque, & McCoy, 1994).

#### Opiates

#### Heroin

The initial effect of heroin is a long-lasting rush of pleasure, as feelings of euphoria replace all worries and awareness of bodily needs (including pain, cold, and hunger). Tolerance to the drug develops quickly, withdrawal is akin to a severe bout of the flu, and serious addiction is likely once a person begins to inject heroin. An active heroin user may be responsible for as much as \$200,000 a year (US) in stolen goods, which is sold to obtain daily heroin doses (Frances & Miller, 1991).

The common intravenous method of using heroin gives the user no control over intake once injected (as opposed to smoking it), factoring into an alarming number of heroinrelated overdoses. Heroin overdoses have increased in Calgary and other larger Canadian cities over the past few years (AADAC, 1996), largely related to a lowered cost of heroin and a very high purity level in recent times. Other factors that contribute to a high overall death rate in heroin users (estimated as twenty times higher than that of the normal population) include use-related infections, suicide, homicide, and accidental death.

Morphine, a painkiller and cough suppressant is highly addictive, both psychologically and physiologically.

**Prescription opiates**, such as Demerol and Codeine, are used for the suppression of pain. Like other opiates, these drugs have the potential to create psychological and physiological dependence. A recent survey found Alberta to have the second highest number of forgeries for prescribed drugs among Canadian provinces (AADAC, 1996). Tranquilizers, such as Valium (Diazepam), Vivol, Librium, Ativan and Surtax produce relief from symptoms of anxiety, depression, and insomnia when prescribed by a doctor. When abused as a street drug, users appear intoxicated, experiencing euphoric dreaminess and elimination of all worries. Overdose potential is also quite high, as rapid tolerance to these drugs necessitates using greater amounts of the drugs to feel their effects (this amount is often dangerously close to the amount needed for an overdose). Physiological and psychological dependence are common, and users often afraid to cope without these drugs. Withdrawal effects in the form of nausea, weight loss, panic attacks, psychosis, and depression can be even more unpleasant than heroin withdrawal (Emmett et al., 1996), and sudden abstinence should never be attempted without professional help. Frances & Miller (1991) indicated that some tranquilizers are only

*reinforcing* for those with a history of chemical dependency, which may factor into why tranquilizer initiation occurs much later than most other drugs.

Amphetamine (AP) and Methamphetamine (MAP) abuse has increased worldwide, and is increasingly being encountered in emergency rooms (Murray, 1998). The effects of APs (Benies, Dexies) and MAPs (crystal, speed) are similar to cocaine, but last longer and are less expensive. Rapid tolerance is common, and psychological dependence to these drugs can be extremely intense. Alongside cocaine and alcohol, these drugs 'have perhaps the highest potential for releasing latent mental illnesses, and withdrawal effects from these drugs often progresses from depression to extreme paranoia (Emmett et al., 1996). Hallucination and delusions, side effects of chronic AP-MAP use, can mimic symptoms of schizophrenia so closely that they are virtually indistinguishable (Murray, 1998).

Some ADHD children and the drug-using population abuse <u>Ritalin</u>, a prescription drug that aids in sustaining attention and behavioural regulation of attentiondeficit/hyperactivity disordered (ADHD) children and adults. Abusers seek the increased alertness and accelerated metabolic properties of Ritalin, and the drug is often abused at raves (Emmett & Nice, 1996).

#### Hard Drug Sequencing

Though the prevalence of hard drug use among adolescents is extensive, the popularity of individual hard drug classes changes from year to year (Keyes & Block, 1984). Segal (1986), reflecting on the fickle sequencing and prevalences of harder drugs

(cocaine, tranquilizers, hallucinogens, etc.) declared that such patterns reflect changes in the availability and popularity of such drugs, and the drug-taking behaviour at the time. Segal found strikingly different patterns of hard drug sequencing among teenagers of the 1980's and adults who experienced teenage life in the 1970's. While the adults experienced these illicits in the order of marijuana, stimulants, hallucinogens, depressants, tranquilizers, and cocaine, youth experienced such drugs in the order of marijuana, stimulants, cocaine, depressants, tranquilizers, and hallucinogens.

It appears that drugs, at their introduction to users, are only experimented with following extensive experiences with other drugs. As more youth become familiar with such drugs, they appear safer, and their availability increases, they occupy stages nearer the beginning of the drug usage sequence. The positioning of depressants and tranquilizers, likely due to difficulties in obtaining such substances and their high withdrawal potentials/dependency properties, accompanied a position near the end of the sequence in both samples. The initiation of prescribed psychoactives, because they are dependent on the actions of a physician, tends to occur later in the sequence (Yamaguchi & Kandel, 1984). The fact that cocaine had switched from the end of the sequence (in the adult sample) to near the beginning of the youth sequence reflected the changing popularity of cocaine (was more popular in the 1980's than the 1970's). As recent research has demonstrated a resurgence in hallucinogen use, it is expected that their current positioning will be more akin to Segal's adult sample (near the beginning of the sequence). Golub and Johnson (1994), using a sample of Manhattan *crack* users, found that hard drug use was most often initiated by whichever hard drug practice was popular during the participants' teen years. In their oldest cohorts (those that were teenagers in the heroin era of the 1960's), nearly all crack abusers were former heroin injectors (81%). Teens during the mid 1980's began hard drug use with cocaine snorting, and fewer subjects indicated heroin injection prior to crack use. Of late eighties teens, 37% of crack abusers initiated the use of crack just after using gateway drugs, with prior heroin injection a rarity (10% of these subjects).

A steep increase in the popularity of cocaine in the mid 1980's led researchers at the time to question whether cocaine itself was becoming a gateway drug to other illicit drugs, particularly heroin (i.e., Mills & Noyes, 1984). Murray (1984) reasoned that cocaine initiation directly followed marijuana use because the two drugs shared many similarities (use of both drugs involves sharing in a group situation, and users of both drugs typically improve at "getting high" following learning the proper usage techniques). More recent studies (i.e., Ellickson, Hayes, and Bell, 1992) found that despite the cheaper cocaine prices and ease of obtaining cocaine in the years preceding the study, there was no evidence that cocaine had attained the status of a gateway drug. Rather, recent research points to the higher potentials of hallucinogens and amphetamines in attaining the status of a gateway drug.

#### Gender Differences

Though patterns may be similar, most studies in this area indicate that males typically
use more drugs, on average, than females (i.e., Kandel et al., 1992), with men significantly more likely to have a history of alcohol dependence than women (18.6% of men, 8.4% of women) (Grant, 1997). Rienzi, McMillin, Dickson, and Crauthers (1996) rationed that this usage discrepancy exists because it is more accepting for males than females to use drugs, particularly marijuana. The age at which such patterns are examined may greatly influence prevalence rates. Though more males begin drug-using behaviours at an early age, females appear to catch up by the age of 15 (Warren, Kann, Small, Santelli, et al., 1997).

Other gender differences surround usage progression. Though most studies have not found gender-specific progression (i.e., Windle, Barnes, & Welte, 1989) a few studies have found cigarettes to be more important for female progression, while alcohol is more important for males (i.e., Kandel et al., 1992; Kandel & Yamaguchi, 1993).

#### **Drug Cumulativeness**

Kandel (1975) speculated that drug use was cumulative in nature. That is, drugs used at higher levels are used in conjunction with drugs used at previous levels. Old drugs are not merely used as stepping stones to drugs higher in the sequence and then "left behind." Rather, "new drugs" are added to the repertoire with the passage of time, with harder drugs used in conjunction with gateway drugs. Use of old drugs may be temporarily suspended, but are returned to after further hard drug experimentation (Segal, 1986). Over 90% of all drug users reflect patterns of involvement consistent with the notion of a cumulative dimension of drug use (e.g., hard drug use accompanied by legal drugs and marijuana) (Donovan & Jessor, 1983; Andrews, Hops, Lichenstein, and Tildesley, 1991). Deviations from this cumulative pattern typically involve using cigarettes without using alcohol, or alcohol and marijuana without cigarettes.

The reverse appears to hold true for drug abstinence, in that drugs used latest in the sequence will be the first to be removed from the repertoire. The first drug experimented with will thus be the "last drug standing." Kandel and Faust, in examining the nature of drug abstinence, found that cocaine and heroin users rarely became abstainers or exclusive legal drug users, but some regress to exclusive alcohol-cigarettes-marijuana use. Exclusive legal drug users were twenty times more likely than hard drug users to become complete abstainers, over a five-month period (10% vs. .5%).

Multiple drug use increases with age and an increased repertoire of drugs (Canada's Drug Strategy, 1989). The simultaneous and concurrent use of multiple drugs and alcohol has become so common that it is a rarity to make a clear clinical distinction between the alcoholic and the drug dependent (Frances & Miller (1991). Many hard drug users may therefore be dependent on drugs lower in the sequence. Robins et al. (1988), cited in Frances and Miller (1991), found high rates of alcoholism among cocaine dependents (84%), barbiturate dependents (71%), opiate dependents (67%), hallucinogen dependents (64%), amphetamine dependents (62%), and marijuana dependents (36%). Martin, Arria, Mezzich, and Buckstein (1993), found that 96% of adolescents admitted to an alcohol abuse treatment centre concurrently used (on average) three drugs other than alcohol.

The cumulative use of drugs poses extreme dangers to users. A four-fold increase in drug related deaths in Edinburgh and Glasgow was deemed to be the result of an increase in mixing heroin with other drugs (usually Temazepam, Diazepam, and alcohol) (Hammersley, Cassidy, & Oliver, 1995). Comparable problems were witnessed in Virginia, USA. McKelway, Vieweg, and Westerman (1990), upon reviewing the autopsy records of 33 persons who had died of acute cocaine intoxication, discovered that 29 (88%) of the victims were also on extraordinarily high doses of other drugs (mostly alcohol and morphine) at the time of overdose.

#### Precursors To Progression

Use at one stage does not inevitably lead to progression to other stages. In fact very few users at one stage progress to the next level. Under the premise of addiction prevention, it would be worthwhile to investigate progression causality. Two factors related to further progression are 1) the age of initiation to drug use and 2) the intensity/frequency of use at preceding stages (Kandel et al., 1992).

## Age of Initiation to Drugs

By and large, the age when particular drugs are begun has shown to have a great impact on substance use and progression. Because alcohol is the initial stage of progression models, most studies have focused on initiation rates to alcohol. The earlier one initiates to legal drugs (likely alcohol) the more likely they are to engage in heavy use of alcohol (Samson, Maxwell, & Doyle, 1989), the greater the number of drugs they are likely to experiment with (Mills & Noyes, 1984), and the greater the likelihood that they are current users of these drugs (Yu & Williford, 1992). The strength of this relationship has been found to increase with age. Robins and Pryzybeck (1985), in Gonzalez (1989), determined that the best predictor of substance abuse in early adulthood was the onset of use prior to age 15. Assuming continuous onset since initiation, by the age of 25, an additional 39% of men who started drinking at age 15 will smoke marijuana, compared to men that initiated alcohol at age 21 (Yamaguchi & Kandel, 1984).

This was further demonstrated by Kandel and Yamaguchi (1993), who examined the initiation ages of cigarettes and marijuana smoking on later progression. The average ages of cigarette and marijuana initiation were 12.9 and 14.6, respectively. Those that initiated cigarette smoking at 13.1 years of age were more likely to report using only alcohol and cigarettes in their lifetime, 12.6 years of age-later marijuana smokers, 11.5 years of age-later cocaine users, and 11.1 years of age-later crack users. Users were also asked to indicate ages of marijuana experimentation: those that initiated at 15.2 years of age were likely exclusive marijuana smokers, 13.5 years of age-later used cocaine, and 13.2 years of age-likely to later use crack. In both scenarios, hard drug users experimented with cigarettes/marijuana a full two years in advance of those that did not later use hard drugs.

Age of drug initiation has also been linked to the successfulness of later quitting substance use. Breslau and Peterson (1996) found that subjects that initiated smoking after turning 13 were 1.6 times as likely to quit than those that began before this age, while those that initiated after turning 17 were twice as likely to quit as those that initiated at 13 years of age.

With the apparent importance of delaying the age by which youth are initiating drug use, it is discouraging to note that youths of today are initiating drug use at much earlier ages than previously. Dryfoos (1998), in comparing American ninth and twelfth graders, found that 28% of ninth graders smoked cigarettes before the age of 13, compared to 22% of twelfth graders.

#### Frequency/Intensity of Substance Use

There is a strong relationship between use at one stage, and progression to the next. Chronic use of cigarettes, alcohol, and marijuana in the mid-twenties is linked to persistence of use in the late 20's (Ravies & Kandel, 1987). Cocaine users are likely to report being heavy (as opposed to infrequent) marijuana users, and marijuana smokers indicate being heavier users of alcohol and cigarettes (Yu & Williford, 1994; Murray, 1984; Kandel & Yamaguchi, 1992).

Some researchers have included separate stages in the typical progression models for *deepened* involvement with the gateway drugs. Donovan and Jessor (1983) found problem drinking to occupy a distinct position, between marijuana use and hard drugs. Elickson, Hays, and Bell (1992), somewhat elaborating on this model, found increased smoking to occupy a stage between all other hard drugs and cocaine/heroin (preceding the "hardest" drugs in the sequence). The final stage, regular marijuana use, followed initiation to cocaine and heroin.

# **CHAPTER 3: METHODOLOGY**

## Sample

Sampling took place at the University of Calgary, inner city Calgary, and the Calgary Remand Centre to obtain a population with varied levels of drug involvement. University students (35.6% of the sample) obtained yellow questionnaires from the University of Calgary (though non-student visitors to the University may have filled out the questionnaires) in the cafeteria area of the Educational Building, on a reserve desk in the MacKimmie Library, outside the Dinnie's Den (a student bar) in Mackimmie Hall, and in the food court area of MacKimmie Hall (the Student's Union). At the other extreme of the drug-using population, blue coloured questionnaires were placed in all units of the Calgary Remand Centre (a holding facility for those who have not yet been sentenced in court). Thirty subjects (12.1% of the sample) were obtained from the Calgary Remand Centre.

A low rate of return from the Calgary Remand Centre necessitated the inclusion of a potentially greater proportion of serious drug users in the inner city sample. One hundred twenty-seven white coloured questionnaires (51.8% of the sample) were returned from places popular among alcohol/illicit drug users, including two stores and businesses that cater to rave-goers, two stores that specialize in marijuana paraphernalia, the Ship and Anchor Pub (a downtown Tavern), and the Mount Royal/Victoria Parks (parks that are frequented by vagrants and "street kids") (See Table 1).

-	Gender of Participants						
Variable	Female	Male	Total				
Sampling Location							
Remand Centre	0	30	30				
Inner-City Calgary	49	75	127ª				
Univ. of Calgary	40	53	93				
Ethnicity							
White	68	126	194				
African American	0	2	2				
Asian	6	11	17				
Aboriginal	2	8	10				
Other	5	4	9				
Not Indicated	8	7	186				
Educational Level							
Grade 1-6	0	2	2				
Grade 7-12	36	71	107				
Comm. College	9	17	26				
Undergraduate	41	58	99				
Graduate	2	9	11				
Not Indicated	1	I	5°				
Average Age	25.88	22.63	24.71				

# Table 1. Demographic Data for Participants

.

<sup>a</sup>three participants from the inner-city sample did not indicate their gender. <sup>b</sup>three participants that did not indicate their ethnicity did not indicate their gender. <sup>c</sup>three participants that did not indicate their educational level did not indicate their gender. in age from 18 to 45 (<u>M</u>=24.7, <u>SD</u>=6.48), with the largest proportion of individuals falling into the 18-21 age bracket (see Figure 1). In terms of ethnicity, though some subjects indicated African American, Asian, or Aboriginal decent, the majority of subjects (77.6%) were white (see Table 1). In respect to educational backgrounds, though some participants indicated elementary school, community college, and graduate or postgraduate education, the majority had either high-school (43%) or university undergraduate backgrounds (40%) (see Table 1).





Age Bracket

## Questionnaire Development

A description of the nature of substance abuse problems must reflect levels of *absolute involvement* with alcohol and other drugs, and include examination of the *consequences* of substance involvement on functioning across various life domains (Mash & Barkley, 1998). Two Questionnaires were given, serving three purposes: 1) to track personal drug usage patterns across the life-span (ages of particular drug initiation, frequency, and cumulativity of use), 2) to identify drug-related problems that persist into adulthood, and 3) to determine diversity issues, such as gender and education level, that might contribute to substance misuse.

## Drug-related Life Problems

Life facets that could be effected by drug abuse, such as the deterioration of interpersonal relationships, family conflict, declines in academic functioning, involvement in criminal or antisocial behaviours, and negative affect (Mash & Barkley, 1998) are addressed with the Drug Abuse Screening Test (DAST). The DAST, a 20-item questionnaire related to drug use in the past 12 months, has a yes/no answering scheme that provides a brief way of measuring problems encountered in everyday life (see Appendix A). El-Bassel, Schilling, Schinke, and Orlandi (1997) found the DAST to possess high internal consistency and test-retest reliability. The DAST has been viewed as a practical tool, with a variety of potential uses (e.g., workplace testing, assessment tools in psychiatric treatment programs) (Staley & El-Guebaly, 1990).

## Track Personal Usage Chronologically

A tool was developed to chronologically track which drugs subjects have tried in the past or currently use (see Appendix B). This served a number of purposes: Determining the age of initiation to drugs (the age at which alcohol/drugs were first experimented with) permitted the grouping of subjects into initiation groups. For the sake of group comparisons, subjects were grouped into four groups of relatively equal proportions, consisting of those that initiated between one and ten years of age (n=58), eleven and twelve (n=47), thirteen and fourteen (n=65), and fifteen to twenty (n=66). This permitted the comparison of subjects that began drug experimentation at the same/different age across the following variables: 1) the number of drugs tried, 2) ages and severity when particular drugs were used with greatest frequency, 3) the number/frequency of drugs currently being used, and 4) current drug-induced impairment to daily functioning (as evidenced by scores on the DAST). The inventory was thus able to track the lifetime progression of drug use, from initiation to current use (e.g., tried alcohol, then marijuana, then amphetamines; used marijuana most at the age of \_\_, etc.). Because the frequency of particular drug use (along with the corresponding age of peak use) was requested, it was possible to determine whether increased frequencies of gateway drug use constituted separate stages in the model. Scoring of the questionnaire used a 7-point Likert scale to rate the frequency of particular drug use in the following series: 0=never, 1=every 2-3 months, 2=once a month, 3=2-3 times a month, 4=weekly, 5=daily, and 6=several times a day.

The instrument was a checklist questionnaire that randomly positioned the most common drugs of abuse (inhalants, alcohol, opiates, Phencyclidine (PCP), cocaine, marijuana, tranquilizers, cigarettes, hallucinogens, amphetamines, prescription opiates, and crack cocaine). Because some drugs were experimented with at the same age, subjects were further asked to order their drug usage chronologically.

Current substance use sections determined the number and frequency of drugs currently being used, and served to track the cumulative nature of drug use (used a 7point Likert Scale, as in the previous section). It was hypothesized that drugs lower in the sequence would be used concurrently with those higher in the sequence (e.g., cocaine users should also smoke marijuana/ cigarettes, and drink alcohol).

## Diversity Issues

While maintaining anonymity, information could be obtained about each subject. Questions addressed in the questionnaire included: 1) current age, 2) gender, 3) ethnicity, and 4) last grade completed (includes grades K-13, community college, university undergraduate, and graduate/Ph.D. levels)

## Scoring

The **DAST** is an easy instrument to score, tallying the number of statements that subjects circled yes to (except for questions 4 and 5, that are reverse scored). Higher DAST scores (maximum=20) reflect greater drug-related impairment to daily functioning as a result of drug use.

The Personal Drug Usage Inventory, developed with the help of Dr. Robert

Williams (a prominent Calgary drug-abuse researcher), required a number of fairly easy calculations:

Number of drugs tried: Number of drugs checked off in the "order tried" category.

**Progression Pattern**: Sequencing patterns by the listed order of initiation.

**Frequency of use at Peak**: Calculated by adding all numbers circled on the Likert scales for peak use; this value represents severity as a function of number and frequency of drugs used at their peak. (Note: Drugs that were used only once in a lifetime were given a value of 0.5, a position between never used and used every 2-3 months.)

Number of Drugs Used Currently: counting the number of drugs that received a usage response of "every 2-3 months" or more.

**Frequency of Current Use**: Calculated by adding up current frequency scores among all drugs, this value represents severity as a function of the number and frequency of drugs presently used.

#### Procedure

Along with cover letters and consent forms, the colour-coded questionnaires (the DAST and Personal Drug Usage Inventory) were placed in envelopes. To solicit participants for the study, the researcher contacted various pubs and shops by phone, detailed the general aim of the study, and further explained why their location would be helpful. The researcher then met in person with interested parties, going through all of the materials in the packets. Thirty to fifty packets were allotted to each location, and packets were placed inside magazine racks. The researcher allowed shop-owners the

discretion as to where in the shop they would like to place the questionnaires. Attached to each magazine rack was a poster that solicited volunteers to participate in an anonymous 10-minute survey on personal drug use (see Appendix C). Permission was granted by owners of the Ship and Anchor (a pub), Divine Decadence and Feroshus (alternative clothing stores), Grassroots and the Hemporium (pipe stores), the University of Calgary Student's Union, the director of the MacKimmie Library, and the program director at the Calgary Remand Centre, to solicit volunteers from their location.

Downtown volunteers were told to fill out questionnaire packets at their leisure (at home, etc.), enclose the questionnaires in the sealed envelopes (provided in the packet), and to mail the questionnaires to the researcher (envelopes were pre-addressed, with the postage provided). University volunteers were also instructed to fill out the questionnaires at their leisure (at home, etc.). Questionnaires were to be placed in a sealed envelope (provided in the packet) and returned to their respective departments, where they were sent to the department of the researcher (Educational Psychology) via the campus mail. Inmate volunteers obtained packets from a location in their respective units. They were likewise instructed to complete questionnaires at their leisure (in the privacy of their cell, etc.), and to return the questionnaires (whether they were filled out or not) to the program director, who placed them in a locked drop-off box. The researcher later picked up these questionnaires.

All of the instructions (for the inmates, students, and the downtown samples) were provided on enclosed cover letters (see Appendix D, E, and F for an example of the inner-city, Remand Centre, and University of Calgary cover letter samples, respectively). Consent forms were provided (see Appendix G), but, for anonymity purposes, they did not require signatures. Rather, consent was inferred from the completion and subsequent returning of the questionnaire packets. Questionnaires were collected until 250 questionnaires were received; at which point the researcher collected the unused packets and magazine racks from the various locations. This process (obtaining the 250 returned questionnaires) took approximately 11 weeks, from July until mid September 1999. Questionnaires were divided into four groups, based on the age of first initiation to alcohol/drugs, and were stored in a locked cabinet in the office of the researcher (See figure 2 for a time-line flowchart).

## Analysis

## Drug Use Patterning

Subjects indicated initial and peak use of each drug, permitting analysis of each subject's drug use sequence. These sequences were compared to determine the prevalence rates of particular sequences (e.g., alc-cigs-MJ, alc-MJ-cocaine, etc.). Furthermore, an analysis of each sequence can determine the prevalence of isolated drug class relationships (e.g., "the frequency that marijuana use is preceded by alcohol use"). Of the many studies that documented the typical alcohol-cigarettes-marijuana-hard drugs progression, the Kandel et al. (1992) 30-year longitudinal study, because of its recency and large sample size, was chosen as a means to compare the progression observed in the





present study. Expected frequencies for Chi-square analysis were derived from these results.

#### Age of Initiation and Usage Progression/DAST Scores

Subjects were grouped by initiation ages into four groups: Those that first experimented with substances at age ten or under, between 11 and 12, between 13 and 14, and those that initiated use following their 15<sup>th</sup> birthday. Group averages were compared by means of a three-way Multivariate Analysis of Variance (MANOVA) of groups (four levels), gender (two 'evels), and education levels (three levels) with DAST scores, the number of drugs ever tried, usage at peak, the number of drugs still being used, and the frequency of current use as the dependent variables. Scheffe Post Hoc Comparisons followed analysis.

## Drug Cumulativeness

Cumulative users were identified as those that continued to use drugs at lower stages, in conjunction with harder drugs. A hard drug user would thus be a cumulative user if he/she concurrently used alcohol, cigarettes, and marijuana (other examples of cumulative drug groupings include marijuana-cigarettes-alcohol, alcohol-cigarettes, and alcohol only). Two previous studies (Donovan & Jessor, 1983; Andrews et al., 1991) reported nearly identical prevalence patterns in respect to cumulative use (approx. 91% of all users). Donovan and Jessor (1983), because of its larger sample size, was chosen as a means to derive expected cumulative use frequencies for Chi-Square Analysis.

## Problematic or Frequent Use

The possibility that increased usage frequencies of alcohol, cigarettes, and marijuana are a requisite for progression was examined by Elickson, Hays, and Bell (1992) and Donovan and Jessor (1983). Unfortunately, these studies used prevalence rates alone to determine sequential patterning (because more people were frequent drinkers than marijuana smokers at the time of these studies, for example, it was concluded that extensive alcohol use preceded marijuana use). As this study permitted investigation of ages to when peak use occurred, it was possible to chronologically include these behaviours in the model. For alcohol, cigarettes, and marijuana, problematic misuse was judged by frequencies circled on page two of the Personal Drug Usage inventory. Dailyseveral times a day use (scored 5-6 on the Inventory) was deemed problematic for alcohol and cigarettes, while marijuana was deemed misused if used weekly, daily, or several times a day (scored 4-6 on the Inventory). A Chi-square analysis was run to determine if peak use of alcohol, cigarettes, and marijuana occurred directly following initiation to legal drugs, marijuana, or hard drugs (e.g., a subject that first experimented with alcohol, cigarettes, and marijuana at the ages of 10, 12, and 14 respectively, and used cigarettes with the greatest intensity at the age of 15, would have used cigarettes most directly following experimentation with hard drugs.

## Ethical Standards

To ensure that ethical standards for research were upheld in this study, the following methods were used to ensure the confidentiality and rights of the participants.

## Informed Consent

All participants received a consent form (see Appendix G) along with the cover letter and questionnaires. Informed consent was inferred from the completion and subsequent return of the questionnaires, and participants were instructed to keep the consent form for their own records. This form detailed what was involved in participating, including the approximate time that the questionnaires would take to complete. The form stated that questionnaires would be obtained anonymously, kept in strict confidence, and that only the group data would be reported in published reports.

## Confidentiality

Confidentiality was upheld by asking participants not to include their names on the questionnaires. All questionnaires were stored in a locked cabinet in the office of the researcher, and will be destroyed upon completion of the study.

#### **CHAPTER 4: RESULTS**

Due to the nature of the sampling procedure (subjects were solicited by posters, in the absence of the researcher), the rate of return was estimated by dividing number of the questionnaire packets that were taken from the magazine racks by the number of questionnaires that were returned. Volunteers took five hundred and twenty-two of the 1500 questionnaire packets sent to the various sampling locations. Two hundred fifty of these were returned, yielding a return rate of approximately 48%.

An examination of drug use histories revealed that alcohol was tried by the most people, with nearly every participant (98%) reported using beer, wine, or sprits. A history of marijuana use was very high among these participants (80%), and nearly equaled prevalence rates for cigarette use (81%). Current use of marijuana (61%) was actually higher than current use of cigarettes (56%). Hallucinogens were the "hard drug" used by the most participants, as two thirds of the participants (66%) had already used hallucinogens. From highest to lowest prevalences, the nine remaining drugs in the survey clustered into three distinct groupings: 1) cocaine and amphetamines, 2) prescription opiates, inhalants, and tranquilizers, and 3) crack, opiates, and PCP (see Figure 3). Approximately 10% more males than females reported use of individual drug classes (exceptions were alcohol, cigarettes, and prescription opiates) (see Table 2).

Figure 3. Self-Reported History of Drug Use (% Using Each Substance)



 Table 2. Self-Reported History of Drug Use by Gender (% Using Each Substance)

	M	ales		Females		Totals
Drug	n	%	n	%	n	%
Alcohol	152	96.20	86	96.63	238	96.30
Cigarettes	123	77.85	74	83.15	197	79.76
Marijuana	131	82.91	64	71.91	195	78.95
Hallucinogens	107	67.72	53	59.55	160	64.78
Cocaine	72	45.57	27	30.33	99	40.08
Amphetamines	69	43.67	29	32.58	98	39.68
Pres. Opiates	38	24.05	23	25.84	61	24.70
Inhalants	43	27.22	13	i4.61	56	22.67
Tranquilizers	38	24.05	16	17.98	54	21.86
Crack Cocaine	36	22.78	11	12.36	47	19.03
Opiates	30	18.99	8	8.99	38	15.38
РСР	21	13.29	8	8.99	29	11.74

Hypothesis #1- Drug use will follow a stage-like pattern, with legal drugs (alcohol and cigarettes) preceding the use of marijuana, which in turn precedes the use of harder drugs.

Page one of the Personal Drug Usage Inventory examined legal drugs (alcohol and cigarettes), marijuana, and hard drugs for their sequential positioning. Two hundred and six participants demonstrated a progression that included legal drugs, marijuana, and hard drugs, producing six possible usage sequences (legal-MJ-hard, MJ-legal-hard, legal-hard-MJ, MJ-hard-legal, hard, legal, MJ, and hard-MJ-legal). It was hypothesized that participants would demonstrate progression patterns akin to Kandel et al. (1992), with the majority (78%) of subjects following the legal drugs-marijuana-hard drugs usage sequence, a small but equal proportion following the marijuana-legal-hard and legalhard-marijuana sequences, and virtually no participants following the other sequences (hard-legal-marijuana, hard-marijuana-legal, and marijuana-hard-legal). Because analytic difficulties arose from the small number of participants expected to follow the latter three trends, these sequences were collapsed into one. Chi-square analysis must still be interpreted with caution, as such patterns were still expected to occur on less than five occasions (despite collapsing the cells). Chi-square analysis demonstrated that the current Calgary population displayed a trend that *did not* differ from typical progression models,  $\chi^2(3)=6.852$ , p=.077 (N=206) (see Table 3). In other words, an extensive (and nearly identical) proportion of participants followed the legal-marijuana-hard drug usage sequence (79%) as in Kandel et al. (1992) (78%). No participants used both marijuana



Figure 4. Trends in Legal, Marijuana, and Hard Drug Use



Table 3. Chi Square Analysis of Drug Patterning (Legal Drugs, Marijuana, andHard Drugs) With Expected Frequencies Derived From Kandel et al. (1992).

Pattern	Observed n	Freq. %	Expected n	Residual	$\frac{(O_i - E_i)^2}{E_i}$	Sig
Legal-MJ-Hard	163	79.13	159.0	4.0	.101	
MJ-Legal-Hard	12	5.83	22.3	-10.3	4.757	
Legal-Hard-MJ	27	13.11	22.3	4.7	.991	
Hard-Legal-MJ	4	1.94	2.4	1.6	1.067	
	206	100	206		6.852	.077

and hard drugs prior to experimenting with alcohol. In terms of deviations from the common sequence, more participants than expected used hard drugs prior to marijuana (14% vs. the expected 11%), while less participants than expected (5% vs. 9%) reversed the predicted ordering of legal drugs and marijuana.

Though these differences were not significant, this suggests that alcohol/cigarettes' role as a gateway to marijuana use has gained importance, while marijuana's role as a gateway to hard drugs has lessened slightly (though not significantly). In other words, more people went straight from legal to hard drugs (in comparison to Kandel et al., 1992) while fewer people used marijuana without first experimenting with legal drugs. The sequences of males and females closely resembled one another (see Figure 4).

Similarly, sole analysis of the gateway drugs (alcohol, cigarettes, and marijuana) produced six possible patterns (alcohol-cigs-MJ, alcohol-MJ-cigs, cigs-alc-MJ, cigs-MJalcohol, MJ-alcohol-cigs, and MJ-cigs-alc). Based on Kandel et al. (1992), it was predicted that nearly half of all participants would indicate following the alcoholcigarettes-marijuana usage sequence, with about one quarter of participants following the cigarettes-alcohol-marijuana usage sequence, one fifth following the alcohol-cigarettesmarijuana usage sequence, and few subjects following the other three trends. Using chisquare analysis, the current Calgary population did not differ from Kandel et al. (1992),  $\chi^2$  (5)=3.272, p=.658 (N=202) (see Table 4). Possibly reflective of the lower drinking age in Alberta, most participants began their use with alcohol (66%). Despite comparable lifetime prevalence rates (and slightly higher rates of current marijuana use),



Figure 5. Trends in Alcohol, Cigarettes, and Marijuana Patterning

Trend

Table 4. Chi Square Analysis of Drug Patterning (Alcohol, Cigarettes, andMarijuana)With Expected Frequencies Derived From Kandel et al. (1992).

Pattern	Observed n	Freq. %	Expected n	Residual	$\frac{(\mathbf{O}_{i}-\mathbf{E}_{i})^{2}}{\mathbf{E}_{i}}$	Sig
Alc-Cigs-MJ	90	44.55	94.9	-4.9	.253	
Alc-MJ-Cigs	48	23.76	42.6	5.4	.685	
Cigs-Alc-MJ	48	23.76	48.9	9	.017	
Cigs-MJ-Alc	4	1.98	6.8	-2.8	1.153	
MJ-Alc-Cigs	8	3.96	5.8	2.2	.834	
MJ-Cigs-Alc	4	1.98	3.0	1.0	.333	
	202		202		3.272	.658

nearly five times as many participants *initiated* drug use with cigarettes, as compared to marijuana (24% vs. 5%) (see Figure 5). Another five percent of participants began their sequence with inhalants.

This stage-like effect (alcohol-cigarettes-marijuana-hard drugs) is best exemplified when individual drugs are examined for drugs that *precede* them in the sequence. Alcohol typically preceded all other drugs, upwards of 90% of the time. Though most participants used cigarettes before marijuana, the number of those that did use marijuana before cigarettes (21%) was higher than expected. This may reflect increased difficulties of obtaining cigarettes, as there is now mandatory checking of identification for cigarette purchasers who look 25 or younger. Results suggest an increased importance of alcohol for later cigarette progression, but a slight decrease in the importance of cigarettes for later marijuana progression. As a whole, alcohol, cigarettes, and marijuana preceded all other drug use (see Table 5). Other notable patterns included hallucinogens preceding the hardest drugs (e.g., opiates, crack cocaine), cocaine preceded crack cocaine, and the use of both cocaine and amphetamines typically preceding opiate use. Overall positioning appears in the order of alcohol, cigarettes, marijuana,

hallucinogens/inhalants, amphetamines, cocaine/tranquilizers/prescription opiates, and PCP/opiates/crack (see Table 5).

Hypothesis #2- Age of initiation to alcohol (or whatever drug was used first) will have a strong negative relationship with usage indices, such that the earlier one initiates drug use, the more drugs they will indicate trying/currently using, the more frequent their use

				{					Pre	eceded	Ву					}
Drug	n	Freq. (%)	Order Tried (avg.)	Age Tried (avg.)	Alc	Cigs	MJ	Hall	Inhal	Атр	Pres Opiat	Coc	Tran	РСР	Opiat	Crack
Alc	238	97%	1,37	13,05		24%	6%	0%	5%	1%	1%	1%	0%	0%	0%	0%
Cigs	197	80%	2.12	14.00	69%		21%	5%	7%	4%	2%	1%	1%	0%	1%	1%
MJ	195	79%	2.89	15.37	97%	68%		3%	8%	5%	4%	2%	4%	1%	2%	1%
Halls	160	65%	4.40	17.17	99%	85%	95%		10%	2%	9%	7%	11%	2%	2%	2%
Inhal	56	23%	4.63	15,90	82%	65%	69%	51%		37%	18%	24%	12%	8%	6%	8%
AMPs	98	40%	5,23	17.46	99%	89%	91%	78%	19%		9%	18%	9%	9%	5%	3%
Pres Opiates	61	25%	6.02	18.20	95%	92%	85%	66%	24%	44%		29%	24%	11%	14%	30%
Coc	99	40%	6,05	19,68	100%	92%	93%	81%	17%	46%	20%		16%	13%	8%	2%
Tranqs	54	22%	6.37	18.30	100%	93%	85%	61%	24%	50%	33%	43%		17%	11%	15%
РСР	29	12%	7,03	17.06	100%	97%	97%	79%	31%	52%	38%	34%	31%		17%	14%
Opiates	38	15%	7.42	19.50	100%	85%	90%	88%	28%	60%	35%	63%	28%	20%		30%
Crack	47	19%	7.80	20.00	100%	91%	93%	89%	20%	65%	35%	78%	37%	28%	17%	

 Table 5. Drugs of Abuse: Prevalences, Order Tried, Age of First Experimentation, and Frequency that Use was Preceded by

 Other Drugs

.

.

will be (past and present), and the higher their scores will be on the DAST (reflecting more drug-related life problems).

Page one of the Personal Drug Usage Inventory asked participants the age when they first initiated drug use, and the age at which they began using subsequent drugs. Average ages of initiation to various drugs ranged from 13 (alcohol) to 20 (cocaine, opiates, and crack) (mean=12.55). As illustrated in Figure 6, though participants indicated experimentation at most ages before the age of 21, the largest proportion of participants initiated drug use between twelve and fourteen years of age (See Figure 6). Initiation rates dwindled at ages further away from this age bracket. As an explanation of drug use below the age of five, a few participants reported being force-fed alcohol as an infant. Not one participant experimented with alcohol or drugs if they had not done so by the age of 20, and five participants indicated never trying alcohol or other drugs.

Table 6 lists the mean scores and Standard Deviations of the four initiation groups on the DAST (0-20 possible scores), the number of drugs ever tried (0-12), the intensity of use at peak (0-72), the number of drugs currently using (0-12), and the frequency of present use (0-72) (see Table 6).

Given the potential interdependence of the dependent variables, a three-way Multivariate analysis of Variance (MANOVA) of groups (four levels), gender (two levels), and education (three levels) was carried out using the DAST scores, the number of drugs used currently/lifetime, and the frequency of use currently/lifetime as the dependent variables. Multivariately, there was no significant sex and group interaction





Ages

Dependent Variable	Age Group	Mean	<u>SD</u>	Min/Max
DAST	overall	5.47	9.72	0-20
	0-10	7.56	5.39	
	11-12	6.58	4.52	
	13-14	5.38	4.17	
	15+	2.81	3.31	
Number Tried	overall	5.44	2.82	1-12
	0-10	6.65	2.73	
	11-12	6.12	2.70	
	13-14	5.82	2.49	
	15+	3.49	2.29	
Frequency At Peak	overall	17.57	10.86	0-63
	0-10	22.13	11.49	
	11-12	19.83	11.45	
	13-14	18.98	8.77	
	15+	10.33	7.88	
Number Still Using	overail	3.13	2.15	0-11
	0-10	3.87	2.17	
	11-12	3.15	2.24	
	13-14	3.51	2.08	
	15+	2.10	1.74	
Current Frequency	overall	10.92	8.29	0-63
	0-10	13.83	8.74	
	11-12	11.48	10.08	
	13-14	11.87	6.88	
	15+	7.04	6.20	

Table 6. Mean Scores, Standard Deviations, and Possible Scores on the DAST, Number of Drugs Tried/Still using, and Usage Frequency at Peak/Currently, Based on Age of Initiation to Drugs (higher scores are indicative of more drug-related life problems, and higher usage frequencies).

effect, Wilk's Lambda =.946, F(15,575)=0.773, p=0.708, no education and group interaction effect, Wilkes Lambda=.912, F(30, 834)=.646, p=.929, no sex and education effect, Wilkes Lambda=.942, F(10, 416)=1.252, p=.675, and no group-sex-education effect, Wilkes Lambda =.903, F(30, 834)=.721, p=.865, signaling that, regardless of gender or education level, usage had similar effects across ages of initiation to drugs. The multivariate effects for Group, Wilkes Lambda =.848, F(15,575)=2.359, p=.023, were significant, meaning that the age of initiation to drug use had an impact on the dependent variables. The multivariate effects for gender, Wilkes Lambda=.986, F(5,208)=0.580, p=.715, were non-significant, meaning that both sexes were similarly effected by the age of initiation to drugs.

Univariately, there were significant effects on all of the dependent variables across initiation ages. The earlier a subject initiated drugs, the more likely he/she was to evidence drug-related life problems (as evidenced by higher scores on the DAST), F (3,212)=4.64, p=.004. Furthermore, not only do these young initiators have experience with more drugs, F(3,212)=9.55, p=0.000, and with a greater intensity, F(3,212)=8.11, p=0.000 in their lifetime, but they continue to use .nore drugs currently, F(3,212)=4.90, p=0.003, and with a greater intensity, F(3,212)=3.22, p=.024. Those that experimented with drugs at later ages were less likely to face drug-related impairment to daily functioning, and report using fewer drugs, less frequently.

Post hoc analysis using the Scheffe method identified significant pair-wise differences between groups (based on ages of initiation) and the dependent variables (see Table 7). Table 7. Univariate F and p Values and Scheffe Post Hoc Significances for Differences Between Initiation Groups.

				Group Con	nparisons			
Dep. Variable	AII	Groups	1/2	1/3	1/4	2/3	2/4	3/4
	تــا	đ	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
DAST	4.64	.004	ı	·	*4<]	,	*4<2	*4<3
Number Tried	9.55	000 <sup>.</sup>	ı	ı	*4<1	ł	*4<2	*4<3
Freq. At Peak	8.11	000	·	·	*4<1	ı	*4<2	*4<3
Number Still	4.90	.003	I	·	*4<	ı	*4<2	*4<3
Current Freq.	3.22	.024	ı	ł	*4<1	1	*4<2	*4<3

.

Note: Asterisks indicate significant differences, p<0.05.

57

All pair-wise differences were observed between groups 4 (initiated following fifteenth birthday) and the other three initiation groups. Other than scores on the DAST (where comparisons between groups one (initiation from 0-10) and three (initiation between 13-14) approached significance levels), dependent variable comparisons among any of the other three groups did not approach significance.

Hypothesis #3-Drug use will be cumulative in nature. That is, drugs used at current stages will be used in conjunction with those at previous stages.

Cumulative users were identified as those that continued to use drugs at lower stages, while using drugs at higher stages. A cocaine abuser that also uses alcohol, cigarettes, and marijuana, for example, is considered a cumulative drug user. Based on Donovan and Jessor (1983), it was predicted that approximately 91% of participants would be cumulative drug users. Despite a close resemblance to Donovan and Jessor (1983) (87% were identified as cumulative users in this study), Chi-square analysis demonstrated that the current Calgary study sample displayed a trend that differed from Donovan and Jessor (1983),  $\chi^2(1)=4.273$ , p=.039 (N=233). This must be interpreted with caution, as the much smaller expected "non-cumulative" cell contributed to over 90% of the contribution to the Chi-square (despite equivalent residuals in both cells) (See Table 8). Approximately nine in ten hard drug users continue using alcohol, cigarettes, and marijuana with harder drugs.

Research Question #4-Examination of Frequency/Intensity of use as a precursor to further progression.

58

Pattern	Observed n	Freq. %	Expected n	Residual	$\frac{(O_i - E_i)^2}{E_i}$	Sig.
Cumulative	203	87.10	212	-9.0	.382	
Non- Cumulative	30	12.90	21	9.0	3.857	
	233	100	233		4.273	.039

Table 8. Chi Square Analysis of Cumulative Versus Non-Cumulative UsagePatterning, With Expected Frequencies Derived from Donovan and Jessor (1983).

Table 9. Chi Square Analysis of High Intensity Alcohol Use: Following Initiation toLegal Drugs, Marijuana, or Hard Drugs.

Pattern	Observed n	Freq. %	Expected n	Residual	$\frac{(\mathbf{O}_{i}-\mathbf{E}_{i})^{2}}{\mathbf{E}_{i}}$	Sig.
Legal Drug Use	11	13.75	26.7	-15.7	9.232	
Marijuana Use	16	20.00	26.7	-10.7	4.288	
Hard Drug Use	53	66.25	26.7	26.3	25.906	
	80	100	80		39.475	.000

Patterning was examined to determine when alcohol, cigarettes, and marijuana were used with greatest intensity (following legal drug use, marijuana use, or hard drug use). As no previous studies directly examined this concept, random use was expected, meaning that an equal proportion of participants were expected to indicate intense use of these substances following legal drug, marijuana, or hard drug experimentation (it must be noted that it is possible to use marijuana with greatest intensity before even initiating legal drugs, as some participants did in fact indicate a progression whereby marijuana initiation preceded alcohol initiation).

As demonstrated through Chi-square analysis, alcohol,  $\chi^2$  (2)=39.48, p=.000 (N=80), cigarettes  $\chi^2$ (2)=37.136, p=.000 (N=132), and marijuana  $\chi^2$ (2)=93.476, p=.000 (N=126), all demonstrated significant patterning differences from expected (random), as frequent use of these substances consistently *followed* initiation to hard drugs. Such a pattern (of peak substance use following hard drug experimentation) accounted for well over half of the contribution to the Chi-Square in all three scenarios (see tables 9-11). Regardless of how long participants had used alcohol, cigarettes, and/or marijuana before hard drug experimentation, they consistently increased their use of these gateway drugs after trying hard drugs.

Research Question #5-What effects do educational levels have on usage progression, severity, and DAST scores?

Though some participants indicated elementary, community college, and graduate/Ph.D. backgrounds, the majority of subjects indicated schooling at the high

Pattern	Observed n	Freq. %	Expected n	Residual	$\frac{(\mathbf{O}_{i}-\mathbf{E}_{i})^{2}}{\mathbf{E}_{i}}$	Sig.
Legal Drug Use	27	20.45	44.0	-17.0	6.5658	
Marijuana Use	28	21.21	44.0	-16.0	5.818	
Hard Drug Use	77	58.33	44.0	33.0	24.75	
	132	100	132		37.136	.000

Table 10. Chi Square Analysis of High Intensity Cigarette Use: Following Initiation to Legal Drugs, Marijuana, or Hard Drugs.

Table 11. Chi Square Analysis of High Intensity Marijuana Use: FollowingInitiation to Legal Drugs, Marijuana, or Hard Drugs.

Pattern	Observed n	Freq. %	Expected n	Residual	$\frac{(\mathbf{O}_{i}-\mathbf{E}_{i})^{2}}{\mathbf{E}_{i}}$	Sig.
Legal Drug Use	1	.79	42.0	-41.0	40.024	
Marijuana Use	36	28.57	42.0	6.0	.857	
Hard Drug Use	89	70.63	42.0	47.0	52.595	_
	126	100	126		93.476	.000

Dependent Variable	Group	Mean	<u>SD</u>	Min/Max
DAST	Overall	5.40	4.68	0-20
	High School	7.45	5.06	
	Comm. College	4.65	4.00	
	University	3.47	3.41	
Number Tried	Overall	5.41	2.82	1-12
	High School	6.37	2.82	
	Comm. College	5.42	2.34	
	University	4.42	2.60	
Frequency At Peak	Overall	17.50	10.85	0-63
	High School	21.08	11.05	
	Comm. College	18.69	9.51	
······	University	13.56	9.64	<u> </u>
Number Still Using	Overall	3.10	2.15	0-11
	High School	3.71	2.31	
	Comm. College	3.27	1.80	
	University	2.44	1.87	
Current Frequency	Overall	10.82	8.30	0-63
	High School	13.61	9.39	
	Comm. College	10.87	5.60	
	University	8.00	6.63	

Table 12. Mean Scores, Standard Deviations, and Possible Scores on the DAST, Number of Drugs Tried/Still using, and Usage Frequency at Peak/Currently Based on Educational Level Attained (higher scores are indicative of more drug-related life problems and higher usage frequencies).
school and university undergraduate levels. Three groupings (K-grade 12, community college, and all levels of university) were used for the purposes of analysis. Table 12 lists the mean scores of the three educational groupings on the DAST (0-20 possible scores), the number of drugs they have tried (0-12), the frequency of their peak use (0-72), the number of drugs they are currently using (0-12), and the intensity of their current use (0-72) (see Table 12).

Just as ages of initiation to alcohol/drugs had a significant impact on the dependent variables, the multivariate effects for education, Wilkes Lambda =.873, F(10, 416)=2.917, p=.002, was also significant, meaning that lower educational levels were associated with more drug-related life problems, more drugs used currently/in the past, and more intense use currently/in the past.

Univariately, there were significant effects on all of the dependent variables across levels of education. Higher education levels were associated with less drug-related life impairments (as evidenced by lower scores on the DAST), F(2,212)=10.104, p=.000, fewer drugs ever experimented with, F(2,212)=7.770, p=0.001, less drug use reported at peak, F(2,212)=8.447, p=0.000, fewer drugs being used currently, F(2,212)=6.801, p=0.001, and a lowered intensity of current use, F(2,212)=8.611, p=.000.

Post hoc analysis using the Scheffe method identified significant pair-wise differences. Though community college students differed significantly from high school/elementary students (backgrounds) in regards to DAST scores, all of the other significant differences (DAST scores and usage frequencies) occurred between those

			Group C	omparisons	
Dep. Variable	All	Groups	High School/ Comm. College	High School/ University	Comm. College/ University
	<u> </u>	p	Sig.	Sig.	Sig.
DAST	10.10	.000*	*HS>CC	*HS>U	-
Number Tried	7.77	.001*	-	*HS>U	-
Freq. At peak	8.45	.000*	-	*HS>U	*CC>U
Number Still	6.80	.001*	-	*HS>U	-
Current Freq.	8.61	.000*	<b>_</b>	*HS>U	-

## Table 13. Univariate F and p Values and Post Hoc Significances for DifferencesBetween Educational Backgrounds.

Note: Asterisks indicate significant differences, p<0.05.

with at least some university experience (undergraduate or postgraduate), and those with only elementary or high school education (see table 13).

Research Question #6- What is the positioning within hard drugs, a category deemed to be determined significantly by the era, availability, and trendiness of such drugs.

As illustrated in Table 2, hallucinogens were the hard drug experimented with by the most participants, followed by cocaine/amphetamines, and prescription opiates/ tranquilizers, with fewer subjects indicating PCP/crack/opiate use (see Table 2). Positioning of the hard drugs was determined from page one of the Personal Drug Usage Inventory, whereby participants provided the age and order that they used various hard drugs. As illustrated in Table 14, approximately two-thirds of the participants identified hallucinogens as the first hard drug they experimented with (this was six times the amount of any other hard drug). It appears that amphetamines are the second hard drug that teens experiment with, and over one third of the participants followed hallucinogen use with AMPs and MAPs. Cocaine placed third in hard drug ordering, and approximately one third of the participants used cocaine at this stage in the sequence (see Table 14).

In comparing Table 2 with Table 14, one can further estimate hard drug positioning. One hundred fifty-six of 160 (98%) hallucinogen users indicated hallucinogen use prior to the use of their fourth hard drug (65% initiated hard drugs with hallucinogens) (see Table 15). Initiation to amphetamines had likewise been nearly completed (85%) by the time three hard drugs were used, while cocaine initiation continued throughout the

Drug	First Hard Drug	Freq. (%)	Second Hard Drug	Freq. (%)	Third Hard Drug	Freq. (%)
Opiates	1	.54	6	4.38	9	8.66
РСР	3	1.62	4	2.91	8	7.69
Cocaine	12	6.49	27	19.71	30	28.85
Tranquilizers	10	5.41	13	9.49	11	10.58
Hallucinogens	120	64.86	27	19.71	9	8.66
Amphetamines	18	9.73	51	37.23	14	13.46
Pres. Opiates	19	10.27	6	4.38	15	14.42
Crack Cocaine	2	1.08	3	2.19	8	7.69
	185	100	137	100	104	100

### Table 14. Chi Square Analysis of Hard Drug Ordering.

Table 15. Amount of Total Hard Drug Use that is initiated Before a Fourth Hard Drug is Used.

Drug	Number	Frequency (%)
Hallucinogens	155	98
Amphetamines	83	85
Cocaine	69	70
Prescription Opiates	40	66
Tranquilizers	34	63
РСР	15	52
Opiates	16	42
Crack Cocaine	13	28
	425	66

sequence (comparable to the rates of Prescription Opiates and Tranquilizers). Among crack users, only 28% identified its use prior to using 4 hard drugs, establishing its position much later in the sequence. Hard drugs thus appear to follow a progression of hallucinogens, amphetamines, and cocaine.

Hard drug use was further examined across population cohorts (based on the current ages of participants). For comparisons sake, participants were grouped into three age categories: 18-22 (46.5% of the sample), 23-29 (34.9% of the sample), and over thirty (18.7% of the sample). The youngest (18-22) and oldest (30+) cohorts experimented with similar amounts of hard drugs, which was more extensive than the middle cohort (23-29). These differences widened at later stages of the sequence (See Figure 7). In other words, fewer hard drugs are being used by 23-29 year-olds, compared to 18-22 year-olds and those over 30.





### **CHAPTER 5: DISCUSSION**

### Summary of the Major Findings

The main findings of the present study may be summarized as follows:

(1) Drug use followed a stage-like pattern, in the order of alcohol, cigarettes, marijuana, and hard drugs. (2) Users that were initiated to drugs following their 15<sup>th</sup> birthday were significantly less likely to be plagued by substance abuse problems than younger initiators. (3) Drugs used at current stages were accompanied by extensive involvement with drugs at previous levels. (4) Increased use of the gateway drugs did not result in further progression. Rather, initiation to hard drugs spurred considerable involvement with the gateway drugs. (5) Individuals with extensive educational backgrounds were less often associated with heavy alcohol/drug use . (6) Hard drug use was more prominent among the youngest and oldest cohorts in the study, and are currently being used in the order of hallucinogens, amphetamines, and cocaine.

Hypothesis #1- Drug use will follow a stage-like pattern, with legal drugs (alcohol and cigarettes) preceding the use of marijuana, which will in turn precede the use of hard drugs.

Chi-square analysis determined that the current Calgary population demonstrated drug use patterns akin to progression models reported over the past 25 years in other studies (i.e., Kandel & Faust, 1975; Kandel et al., 1992). Drug use and abuse did not simply occur at random, but was acquired through a specific and invariant sequence of increasing drug involvement (Newcomb & Bentler, 1986). Nearly 80% of the participants that did go on to use hard drugs followed a sequential pattern that began with alcohol (around the age of 12), and was followed by cigarettes, marijuana, and experimentation with harder drugs (hallucinogens, cocaine, amphetamines, prescription opiates, tranquilizers, crack cocaine, opiates, and PCP). It was a rarity for participants to indicate using marijuana or hard drugs prior to legal drugs, or to use hard drugs before marijuana (see Table 5). This ordering has remained stable over the past 25 years, and transcends age, gender, usage severity, and educational levels (Kandel & Faust, 1975; Yu & Williford, 1992; Kandel & Yamaguchi, 1993; Yu & Williford, 1994). It thus appears that hard drug use will not occur without prior alcohol, cigarettes, and marijuana experimentation.

### Explanations for the Stage-Like Progression

As the drug use sequence is confounded by a number of other factors (such as availability, price, increasing illegality, increasing psychoactive effects, and further involvement with a drug-using peer culture), it is impossible to determine *exactly* what causes the legal drugs-marijuana-hard drugs sequence among youth (Kandel, 1975). Under the assumption that different drug effects are *desired* at certain ages, some researchers (i.e., Yamaguchi and Kandel, 1984; Segal, 1986) have proposed that various drugs are simply initiated and used at these ages. Sharp rises in alcohol and cigarette experiences are found after the age of ten, marijuana initiation peaks at the age of 13 (and declines thereafter), while amphetamine and cocaine initiation peaks at the age of 15 (and then declines in new experimenters). Dwindling initiation rates to various drugs does not imply, however, that overall prevalence rates have dropped, as use typically continues following original experimentation. In fact, users add drugs to their repertoire with the passage of time.

Keyes and Block (1984) recognized that various transitions accompany certain ages. Some of these transitions may lead to a decrease in drug use (e.g., marriage, becoming a parent, going to college, becoming a full-time worker), while others may lead to increases in drug use (e.g., going to junior high school, moving out of the parental home but not being married) (O'Malley, Bachman, and Lloyd, 1984). These explanations do not discuss which and why particular drugs accompany such life transitions, and have failed to explain why youth do not use drugs at higher levels unless they have previously used drugs earlier in the sequence (e.g., it is unlikely that cocaine would be initiated without prior use of alcohol, cigarettes, and marijuana).

Another explanation for stage-like patterning, the problem behaviour hypothesis (Miller, 1994), suggests that some people will try all substances (the problem group), while others will never experiment with substances (the healthy group). This hypothesis suggests a latent tendency or underlying construct (e.g., impulsivity, sensation-seeking tendencies) behind drug use. Though there are those at both usage extremes (abstainers and those that use all drugs), this theory fails to account for the large majority of participants in-between these extremes. Most alcohol users do not become marijuana smokers, and the majority of marijuana smokers do not progress to harder drug use (Kandel, 1999). Though personal detriments likely contribute to drug initiation, the problem behaviour hypothesis does not adequately explain *further* progression.

Cohen (1972), in discussing the association of alcohol, marijuana, and the harder drugs, discussed that underage youths purchase alcohol illegally when they first initiate to alcohol (through fake identification, paying an adult to purchase alcohol for them, etc.). Though purchasing alcohol from a liquor store would not increase the availability of marijuana or harder drugs, it is possible that this process (of illegally purchasing alcohol) exposes and sensitizes youths to the risks involved in purchasing drugs. Cohen further hypothesized that the mild effects of marijuana/hashish make it a social stimulant similar to alcohol. Multiple drug use occurs for some people because other drugs become more readily available once one is initiated to marijuana (through increased contacts and the recruitment of peers in the drug-using subculture), other drugs may seem less dangerous following marijuana use, and the resistance to other drugs is weakened (Andrews et al., 1991). The variant nature of hard drug sequencing, as opposed to the stable nature of gateway drug progression, may in part reflect the *sharing* of *selective drugs* among peers.

Welte and Barnes (1985) felt that the use of a particular drug makes the use of the next drug in the sequence, considered more risky or deviant, seem like a smaller and more acceptable step to the user. This may help to explain the common finding that cigarettes are more important for females than males in the progression from alcohol to marijuana. Females may deem marijuana smoking too great a leap from alcohol use, while the intervention of cigarettes may make the transition more gradual (note: this was not as apparent in the present study). Users may further feel that they lost the "kick" that they once got from a particular substance, and subsequently experiment with stronger substances to revive the high or "good feeling" (Flemming et al., 1989). This sequence of adaptations and progression may be a socially learned phenomenon that is reinforced through subsequent subjective experiences.

It thus appears that though personal factors (e.g., sensation-seeking tendencies, job and marital status, peer groups, etc.) may be responsible for when and why alcohol is initiated, a combination of many factors (increased availability through more user contacts, drug similarities, desensitization to risk factors, and the desire to achieve a stronger "high") contribute to further drug progression.

Hypothesis #2- Age of initiation to alcohol (or whatever drug was used first) will have a strong negative relationship with usage indices, such that the earlier one initiates drug use, the more drugs they will indicate experimenting with/currently using, the more frequent their use will be (past and present), and the higher their scores will be on the DAST.

An examination of Figure 6 provides a reflection of the ages at which Calgary teens are initiating drug use. Though the mean age at which initiation to alcohol/drugs (12.55) was in line with past research (i.e., Hindmarsh & Opheim, 1990; Kandel & Yamaguchi, 1993), there were an alarming number of participants that initiated drug use below the age of 11 (approximately one quarter of the sample). Sharp decreases in initiation occurred following the age of 17, and not one participant initiated the drug use sequence after turning 21. This is in line with Kandel and Logan (1984), who found that those who have not initiated to alcohol, cigarettes, and marijuana by their 20<sup>th</sup> birthday would likely never experiment with alcohol/drugs in their lifetime (see Figure 6).

The present study found higher DAST scores and usage frequencies to be associated with lower initiation ages. The younger participants were when they first experimented with alcohol/drugs, the more likely they were to evidence drug-related life problems (as evidenced by higher scores on the DAST) and higher usage scores. Young initiators not only experimented with more drugs and with a greater intensity in their lifetime, but these patterns of use persisted to the present (see Table 6). In line with similar studies (i.e., Mills & Noyes, 1984; Yamaguchi & Kandel, 1984; Newcomb & Bentler, 1986; Samson, Maxwell, & Doyle, 1989; Yu & Williford, 1992; Kandel & Yamaguchi, 1993; Yu & Williford, 1994; Hawkins, Graham, Maguin, Abbott, et al., 1997), though later initiators did experience some drug use, they reported less *problematic* use.

Despite the association of earlier drug initiation and problematic drug use, Scheffe post hoc comparisons among the four initiation groups (0-10, 11-12, 13-14, and 15+) only found significant differences between group 4 (initiated alcohol/drugs following their 15<sup>th</sup> birthday) and the other three initiation groups. Those participants that *postponed* alcohol/drug initiation past their 15<sup>th</sup> birthday experienced significantly less drug-related life problems and usage frequencies. This is best illustrated with an example: Though a seven year-old initiator would evidence greater drug-related life impairment than an eleven year-old initiator, a fifteen year-old initiator would be *significantly* less likely than the other two participants to evidence such drug-related problems. The average person thus has a significantly greater chance of experiencing substance-related problems than the minority that initiate following their fifteenth birthday (recall that the average age of alcohol/drug initiation is 12.55). Increasing the number of people that delay use past this critical age of fifteen is an obvious prevention goal.

The age by which 90% of users initiate particular drugs is 18 for alcohol, 19 for cigarettes, 20 for marijuana, and 21 for hallucinogens (cocaine, tranquilizers, and opiates have initiation rates that progress throughout the 20's) (Kandel & Logan, 1984). Yamaguchi and Kandel (1984) speculated that earlier ages of onset to drug use (usually alcohol and cigarettes) *lengthens* the time period during which individuals are at risk for progression to the next stage, and is relevant at *all* levels of drug use. Men who use marijuana before the age of 16 and women before the age of 14 have a significantly higher chance of later using harder drugs. If marijuana use is not initiated by the age of 22 and hard drugs initiated by the mid-twenties, it is unlikely that these drugs will ever be experimented with (Yamaguchi & Kandel, 1984; Golub & Johnson, 1994). Taken as a whole, such research implies critical initiation ages for each stage in the model. If drugs are not used during their "critical period," it is unlikely that they ever will be. The earlier that one initiates these substances during this critical time period, the more likely that he or she will continue using at that stage, and also progress to the next stage

75

(Yamaguchi & Kandel, 1984).

Hypothesis #3-Drug use will be cumulative in nature. That is, drugs used at current stages will be used in conjunction with those at previous stages.

Though there were significantly less cumulative users in this study than Donovan and Jessor (1983) (due to a small expected N), nine out of ten hard drug users were still cumulative users (e.g., continued to use marijuana, cigarettes, and alcohol, in conjunction with hard drugs). As in past research (Kandel & Faust, 1975; Segal, 1986; Ellickson et al., 1992), drugs at lower stages were not replaced; drug repertoires were merely added to and deepened. Those that do progress to harder drugs thus not only face the risks posed by individual drugs, but they face the additive dangers involved in the mixing of drug classes.

There are a number of reasons that polydrug use would be perceived as attractive to users. The high from a stimulant (e.g., cocaine) is better maintained from a depressant (e.g., alcohol). Some drugs are used to counteract the negative effects of other drugs (e.g., using sedatives to counteract insomnia following a cocaine high), while drugs with similar effects may act as substitutes when the desired drug is not available (e.g., prescription opiate use when heroin is not attainable). Finally, the *withdrawal effect* of one drug may be alleviated by the intoxicating effect of another (e.g., cocaine-withdrawal depression being alleviated by alcohol) (Frances & Miller, 1991). It is not uncommon for users to become addicted to the drugs used to calm the side effects of other drugs. (Milkman & Sunderwirth, 1987).

### Research Question #4- Frequency/intensity of use as a precursor to further progression.

The present findings do not support the contention that heavier use of alcohol, cigarettes, and/or marijuana necessarily precede progression to the harder drugs. Though intense involvement with these gateway drugs did in fact constitute separate and distinct stages in the model, this increase in use occurred *following* initiation to the hard drugs. Though heavy drinkers were no more likely than infrequent drinkers to progress to hard drug use, a hard drug user *was* more likely than alcohol, cigarette, and/or marijuana users to later drink excessively.

Bailey (1992), however determined that *increases* in usage frequency may have characterized those that progressed to higher stages. The *relative* increase in usage frequency (compared to amounts used at initiation) was more important than the actual amount of the drug used. Heavy drinkers would thus only progress to higher order drugs if their alcohol intake was continuously increasing. Relative increases in drug use should be addressed in future research before ruling out the possibility that increased gateway involvement precedes hard drug use.

# Research Question #5-What effects does educational level have on usage progression, severity, and DAST scores?

Students with at least some university backgrounds experienced significantly less drug-related life problems and lower usage frequencies than those with only high school backgrounds. This does not imply that university schooling delays the age by which original experimentation with drugs occurs (e.g., through drug education and peer pressure to abstain), as drug initiation typically occurs well in advance of the university years (mean age of initiation=12.55). University factors that could conceivably relate to the curbing of drug use include being unable to cope with increased university demands (studying, showing up for morning classes, etc.) while maintaining previous levels of drug use, and/or a change in interests and goals. Breslau and Peterson (1996) rationed that college bound students may stop smoking because fewer of their new peers smoke (many college students come from middle class, college-educated families). Such explanations assume that university schooling factors into decreasing substance use patterns that have already begun. As, discussed previously, however, once higher levels of drug involvement are reached, it is unlikely that users will significantly decrease their drug dependence tendencies. It is therefore unlikely that heavy illicit drug users will cease use after attending college.

Perhaps similar underlying factors bear both on the decision to pursue university education and to abstain from early drug involvement. Both internal factors (e.g., susceptibility to peer pressure, impulsivity, sensation-seeking tendencies) and external factors (e.g., parental control, peer group, drug availability) are likely involved in these decisions. Community college students did not differ significantly from high school or university students in the extensiveness of their use, but they did tend to use more drugs than those with university schooling, and less drugs than those with only high school backgrounds.

### Research Question #6- Hard Drugs Positioning.

Subjects in the youngest cohort (those that would have been 13-18 years of age in the mid 1990's) are using drugs at approximately the same rate as the oldest cohort (those whose teen years took place in the seventies and eighties) (see Figure 7). Congruent with research in other geographical areas. (i.e., Mash & Barkley, 1998; Hindmarsh, Porter-Serviss, & Opheim, 1994; Canada's Drug Strategy, 1998), noticeable declines in drug involvement in the early/mid 1990's are being replaced by drug taking behaviours similar to the 1970's and early 1980's.

Hard drug use currently appears in the order of hallucinogens, amphetamines, and cocaine. The recent popularization of the rave scene could explain why hallucinogens and amphetamines (drugs commonly used at these raves) are the first hard drugs being experimented with. Hallucinogens (LSD, Ecstacy, and Magic Mushrooms), the drugs that have experienced the most dramatic upsurge in use over recent years, (Hindmarsh et al., 1994), provide users with feelings of euphoria, togetherness, energy to dance all night, and sensory/visionary intensifications. Users of LSD, Ecstacy, and Magic Mushrooms face the unique risks associated with each drug (e.g., LSD flashbacks, eating poisonous mushrooms, and depression from Ecstacy withdrawal).

Amphetamines (AP) and Methamphetamines (MAP), likewise provide users with energy to dance for hours, but also contain cocaine-like properties (hyper alertness, etc.). High potentials for tolerance, psychological dependence, and releasing latent mental illnesses increase the dangers of regular AP use, and APs are increasingly being encountered in emergency rooms worldwide (Murray, 1998).

Cocaine's major effects include increased self-confidence, greater energy and hyperalertness, and euphoric mood alterations (Zimbardo, 1992). These effects may be particularly desirable following departure from the teen rave scene, and entrance into the adult club scene. Depressive lows following cocaine highs factor into the deterioration of the nasal passage, and a high rate of overdoses.

### Implications and Future Directions

A number of implications can be drawn from the present study. Those using harder drugs are also likely to be users of alcohol, cigarettes, and marijuana. Hospitals must be alert to the lethal trends in mixing drugs, and treatment programs must be aware that it is a rarity for addicts to be dependent on only drug. In contrast to this widened spectrum facing treatment programs, prevention efforts must be specific in targeting legal drugs (particularly alcohol).

As discussed by Yamaguchi and Kandel (1984), targeting drugs earlier in the sequence will reduce the later use of marijuana, and the prevention of early marijuana involvement will reduce involvement with the harder drugs. Though beliefs about the dangers and health risks of *specific* substances corresponds to lower usage rates for those specified drugs (Berdiansky, 1991), most students do not understand the dangers associated with drug use (Hindmarsh & Opheim, 1990). Teaching the lethal effects of the hardest drugs to youths may implicitly de-emphasize the dangers of the gateway drugs (alcohol, cigarettes, and marijuana). Berdiansky (1991) speculated that teaching

the immediate consequences of the gateway drugs may be more useful than teaching the long-term effects of these drugs.

Prevention programs that promote "responsible use" of drugs (e.g., knowing one's limits, steering clear of harder drugs) appears discredited by this study, as mere experimentation with substances puts users at a risk for progression to successive stages. Heavier use of alcohol, cigarettes, and marijuana was not a requisite for progression to the harder drugs, as intense use of these substances *followed* experimentation with hard drugs. Congruent with Robins and Pryzybeck (1985), in Gonzalez (1989), the best predictor of substance abuse in early adulthood was the onset of use prior to the age of fifteen.

Effective prevention programs must attempt to delay substance use, and should begin programming well in advance of the age of twelve, possibly in early and middle elementary schooling (Elders et al., 1994; Keys & Block, 1984; Blaze-Temple & Kail Lo, 1992). Though intriguing, it has yet to be tested whether delaying alcohol and cigarette onset will in fact reduce later substance involvement, and the concept must be examined in future research. Governmental efforts at delaying substance initiation have taken the form of stiffer drug-related penalties (has not significantly curbed drug use) and hiking taxes on alcohol and cigarettes (has been shown to slightly reduce the number of teens that use these substances) (Saffer and Chaloupka, 1995).

It is apparent that programs aimed at delaying substance use must target high-risk groups, incorporating both psychosocial and personal risk factors. Psychosocial factors predisposing youth to initiate drugs at earlier ages include peer factors (drug using friends) and parental factors (parent use, family disruption, parental attitudes towards drug use, communication barriers/authoritarian parenting style, less parental supervision) (Newcomb, Huba, & Bentler; 1983; Babst, Miran, & Koval, 1976; Jurich, Polson, Jurich, & Bates, 1985). Youth at higher risk for earlier initiation to drugs include those with limited abilities for managing negative mood states, are unskilled in appropriate social interactions, have difficulties experiencing positive feelings without the use of alcohol/drugs, and are ineffective in managing social pressures for drug involvement (Bentler, 1992; Pandina & Schuele, 1983). These youths form expectations that the use of alcohol/drugs will facilitate social interaction, provide relief from stress, promote acceptance within the peer group, and produce positive feelings associated with being "high." Other temperamental factors predictive of early substance use among youth include poor impulse control and sensation-seeking tendencies.

Mash and Barkley (1998) suggest a cognitive behavioural skills training program for high-risk youth that may well serve to provide alternatives to drug use. These skills may be incorporated into school curricula, and include giving and receiving criticism/expressing feeling, dealing with conflict (anger and frustration), managing negative emotions, refusal skills, coping with high-risk situations, and goal setting/alternative activities.

The importance of psychosocial factors in predicting later drug use necessities the inclusion of parents and communities in prevention efforts (Hindmarsh & Opheim,

1990). Research must determine environmental factors that contribute to school attachment and pro-social attitudes (Jenkins, 1990). Akin to the pro-active stance of the community in the early 1980's, drugs must again be deglamourized. Through commercials and public lectures, non-users made white-out and glue sniffing appear dirty and "uncool" to these users, and the inhalant epidemic ended.

### Summary and Conclusions

The present study attempted to link the substantial evidence of drug use sequencing with research examining the effects of early initiation to alcohol/drugs on later drugtaking behaviours. The results support the enduring nature of drug progression models, as the Calgary population followed progression patterns similar to youths in the United States, Israel, and France, over the past 25 years. Calgary youth typically begin using drugs around the age of 12, in the order of alcohol, cigarettes, and marijuana. Following initiation to marijuana, some teens will experiment with hallucinogens (most likely magic mushrooms) and amphetamines. As the teen era ends (and throughout the 20's), some of these hallucinogen/amphetamine users will initiate cocaine use. Though this progression is not inevitable (only a small percentage of users will reach successive stages), users at preceding stages face a greater risk for progression to the next stage. It appears that the earlier that youth begin using substances, the further they will progress through the model, and the greater the likelihood that they will be plagued by drugrelated problems in adulthood. Teens that delayed the onset of drug initiation past the age of fifteen were significantly less likely than other teens to experience further

progression and drug-related life problems.

Though drug use has not yet attained levels comparable to the 1970's, the ages of initiation to drugs continues to decline. If such trends persist, the unfortunate result could be degraded neighborhoods, reduced safety at all levels of society, and major economic expense. It is evident that government involvement will be a necessary component of such prevention programs, and such support will require the concentration of future research on evaluating measures that postpone such initiation.

### References

Adler, I. & Kandel, D. (1981). Cross-cultural perspectives on developmental stages in adolescent drug use. Journal of Studies on Alcohol, 42(9), 701-715.

Alberta Alcohol and Drug Abuse Commission. (1996). <u>Quick Facts About</u> <u>Alcohol, Other Drugs, and Problem Gambling</u>. Edmonton: Alberta Alcohol and Drug Abuse Commission.

Andrews, J., Hops, H., Ary, D., & Lichenstein, E. (1991). The construction, validation, and use of a Guttman scale of adolescent substance use: An investigation of family relationships. Journal of Drug Issues, 21(3), 557-572.

Babst, D., Miran, M., & Koval, M. (1976). The relationship between friends' marijuana use, family cohesion, school interest, and drug abuse prevention. <u>Journal of Drug Education, 6,</u>23-41.

Bailey, S. L. (1992). Adolescent multi substance use patterns: The role of heavy alcohol and cigarette use. <u>American Journal of Public Health, 82(9)</u>, 1220-1224.

Ball, J. C. (1967). Marijuana smoking and the onset of heroin use. <u>British</u> Journal of Criminology, 7(4), 408-413.

Berdiansky, H. (1991). Beliefs about drugs and use among early adolescents. Journal of Alcohol and Drug Education, 36(3), 26-35.

Blaze-Temple, D., & Sing, K. L. (1992). Stages of drug use: A community of Perth teenagers. <u>British Journal of Addictions, 87</u>, 215-225.

Brady, K., Casto, S., Lydiard, B., & Malcolm, R. (1991). Substance use in an impatient psychiatric sample. <u>American Journal of Drug and Alcohol Abuse</u>, 17(4), 389-

397.

Breslau, N., & Peterson, E.L. (1996). Smoking cessation in young adults: Age at initiation of cigarette smoking and other suspected influences. <u>American Journal of Public</u> <u>Health, 86(2), 214-220</u>.

The Office of Alcohol, Drugs, and Dependency Issues. (1989). <u>Canada's Drug</u> <u>Strategy</u>. Ottawa: Author.

Dinwiddie, S. H. (1994). Abuse of inhalants: A review. <u>Addictions</u>, 89(8), 925-939.

Donovan, J. E., & Jessor, R. (1983). Problem drinking and the dimension of involvement with drugs: A Guttman scalogram analysis of adolescent drug use. <u>American</u> Journal of Public Health, 73(5), 543-552.

Dryfoos, J.G. (1998). <u>Safe Passage: Making it Through Adolescence in a Risky</u> <u>Society</u>. New York: Oxford University Press.

Edlin, B. R., Irwin, K. L., Faruque, S., Mccoy, C., et al. (1994). Intersecting epidemics: Crack and cocaine use and HIV infection among inner-city young adults. <u>New</u> <u>England Journal of Medicine, 33(21), 1422-1427</u>.

El-Bassel, N., Schilling, R. F., Schinke, S., & Orlandi, M. (1997). Addressing the . utility of the Drug Abuse Screening Test in a workplace. <u>Research on Social Work</u> <u>Practice, 7(1), 99-114</u>.

Elders, M. J., Perry, C. L., Ericksen, M. P., & Giovini, G. A. (1994). The report of the surgeon general: Preventing tobacco use among young people. <u>American Journal</u> <u>of Public Health. 84(4)</u>, 543-547. Ellickson, P. L., Hays, D. B., & Bell, R. M. (1992). Stepping through the drug use sequence: Longitudinal scalogram analysis of initiation and regular use. Journal of <u>Abnormal Psychology</u>, 101(3), 441-451.

Emmet, D., & Nice, G. (1996). <u>Understanding Drugs: A Handbook for Parents.</u> <u>Teachers, and Other Professionals</u>. United Kingdom: Jessica Kingsley Publishers Ltd.

Flemming, R., Leventhal, H., Glynn, K., & Ershler, J. (1998). The role of cigarettes in the initiation and progression of early substance use. <u>Addictive Behaviours</u>, <u>14(3)</u>, 261-272.

Frances, R. G., & Miller, S. I. (1991). <u>Clinical Textbook of Addictive Disorders</u>. New York: The Guilford Press.

Gavin, D. R., Ross, H. E., & Skinner, H. A., (1989). Diagnostic validity of the Drug Abuse Screening Test in the Assessment of DSM-III drug disorders. <u>Addictive</u> <u>Behaviours, 14(3), 387-392</u>.

Golub, A., & Johnson, B. D. (1994). Cohort differences in drug-use pathways to crack among current crack abusers in New York City, <u>Criminal Justice and Behavior</u>, <u>21(4)</u>, 403-422.

Gorny, S. W. (1994). Inhalant abuse as an adolescent drug problem: An overview. <u>Child and Youth Care Forum, 23(3)</u>, 161-175.

Gonzalez, G. M. (1989). Early onset of drinking as a predictor of alcohol consumption and alcohol-related problems in college. <u>Journal of Drug Education</u>, 19(3), 225-230.

Hammersly, R., Cassidy, M. T., & Oliver, J. (1995). Drugs associated with drug-

related deaths in Edinburgh and Glasgow, November 1990 to October 1991. Addiction, <u>9(7)</u>, 959-965.

Hawkins, J. D., Graham, J. W., Maguin, E., Abott, R, et al. (1997). Exploring the effects of age of alcohol use initiation and psychosocial risk factors on subsequent alcohol misuse. <u>Journal of Studies on Alcohol, 58(3)</u>, 280-290.

Hindmarsh, K., & Opheim, E. (1990). Drug abuse in western Canada and the North West territories. International Journal of the Addictions, 25(3), 301-305.

Hindmarsh, K. W., Porter-Sevais, S., & Opheim, E. (1994). Alcohol and drug use by students from western Canada in grades six through twelve. <u>International Journal</u> of the Addictions, 29(7), 829-835.

Jurich, A. P., Polson, C. J., Jurich, J. A., & Bates, R. A. (1985). Family factors in the lives of drug users and abusers. <u>Adolescence, 20</u>, 143-154.

Kandel, D. B. (1975). Stages in adolescent involvement in drug use. <u>Science</u>, <u>190</u>, 912-914.

Kandel, D. B. (1999). E-mail conversation discussing differences between gateway and stepping stone theory of drug use progression.

Kandel, D. B., & Faust, R. (1975). Sequence and stages in patterns of adolescent drug use. <u>American Psychiatry</u>, 32, 923-932.

Kandel, D. B., & Logan, D. (1984). Patterns of drug use from adolescence to

young adulthood: Periods of risk for initiation, continued use, and discontinuation.

American Journal of Public Health, 74(7), 660-666.

Kandel, D. B., Yamaguchi, K., & Chen, K. (1992). Stages of progression in drug

involvement from adolescence to adulthood. Further evidence for the gateway theory. Journal of Studies on Alcohol, 53(5), 447-457.

Kandel, D. B., & Yamaguchi, K. (1993). From Beer to crack: Developmental patterns of drug involvement. <u>American Journal of Public Health, 851, 851-855</u>.

Keyes, S., & Block, J. (1984). Prevalence and patterns of substance use among early adolescents. Journal of Youth and Adolescence, 13(1), 1-14.

Lenton, S., Boys, A., & Norcosse, K. (1997). Raves, drugs, and experience: Drug use by a sample of people who attend raves in Western Australia. <u>Addiction</u>, <u>92(10)</u>, 1327-1337.

Martin, C. S., Arria, A. M., Mezzich, A. C., & Buckstein, O. G. (1993). Patterns of polydrug use in adolescent alcohol abusers. <u>American Journal of Alcohol and Drug</u> <u>Abuse, 19</u>(4), 511-521.

Mash, E. G., & Barkley, R. A. (1998). <u>Treatment of Childhood Disorders 2<sup>nd</sup> Ed.</u> New York: The Guilford Press.

Mckelway, R. Vieweg, V., & Westerman, P. (1990). Sudden death from acute cocaine intoxication in Virginia in 1988. <u>American Journal of Psychiatry, 14</u>7(12), 1667-1669.

Milkman, H., & Sunderwirth, S. (1987). <u>Craving for Ecstacy: The Consciousness</u> and Chemistry of Escape. Canada: D. C. Health and Company.

Miller, S. M. (1991). Substance-exposed infants: The youngest victims of the drug epidemic. <u>Child and Family Behavior Therapy</u>, 13(4), 63-71.

Miller, T. Q. (1994). A test of alternate explanations for the stage-like

progression of adolescent substance use in four national samples. <u>Addictive Behaviors</u>, <u>19(3)</u>, 287-293.

Mills, C. J., & Noyes, H. L. (1984). Patterns and correlates of initial and subsequent drug use among adolescents. Journal of Consulting and Clinical Psychology, <u>52(2)</u>, 231-243.

Murray, G. F. (1984). The cannabis-cocaine connection: A comparative study of use and users. Journal of Drug Issues, 665-675.

Murray, J. (1998). Psychophysiological aspects of amphetamine-

methamphetamine abuse. Journal of Psychology, 132(2), 227-237.

Newcomb, M., & Bentler, P. M. (1986). Frequency and sequence of drug use: A longitudinal study from adolescence to young adulthood. <u>Journal of Drug Education</u>, <u>16(2)</u>, 101-120.

Oetting, E. R., Beauvais, F., & Edwards, R. (1989). Crack: The epidemic. School Counselor, 37(2), 128-136.

O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (1984). Period, age, and cohort effects on substance use among American youth, 1976-82. <u>American Journal of Public Health, 74(7)</u>, 682-688.

Osborn, J. E. (1996). Editorial: Drug use and behaviour change. <u>American</u> Journal of Public Health, 86(12), 1698-1699.

Pandina, R. J., & Schuele, J. A. (1983). Psychosocial correlates of alcohol and drug use of adolescent students and adolescents in treatment. <u>Journal of Studies on</u> <u>Alcohol, 44</u>, 950-973. Ravies, V. H., & Kandel, D. B. (1987). Changes in behavior from the middle to late twenties: Initiation, persistence, and cessation of use. <u>American Journal of Public</u> <u>Health, 77(5), 607-611</u>.

Rienzi, B., McMillan, J. D., Dickson, C. L., & Crauthers, D. (1996). Gender differences regarding peer influence and attitude towards substance abuse. <u>Journal of</u> <u>Drug Education, 26(4)</u>, 339-347.

Rice, P., Kelman, S., & Miller, L. S. (1991). Estimates of the economic cost of alcohol, drug abuse, and mental illness, 1985 and 1988. <u>Public Health Reports, 106</u>, 281-292.

Saffer, H., & Chaloupka, F. (1995). <u>The Demand for Illicit Drugs.</u> Working <u>Paper No. 5238</u>. Massachusetts: The National Bureau of Economic Research.

Samson, H., Maxwell, C. O., & Doyle, T. F. (1989). The relation of initial alcohol experiences to current alcohol consumption in a college population. <u>Journal of Studies on Alcohol, 50(3)</u>, 254-260.

Schuetz, C. G., Chilcoat, H. D., & Anthony, J. C. (1994). The association between sniffing inhalants and injecting drugs. <u>Comprehensive Psychiatry</u>, 35(2), 99-105.

Segal, B. (1986). Age and first experience with psychoactive drugs. <u>The</u> <u>International Journal of the Addictions, 21(12), 1285-1306</u>.

Sridhar, K., Raub, W., Weatherby, N., Metsch, L., et al. (1994). Possible role of marijuana smoking as a carcinogen in the development of lung cancer at a young age. Journal of Psychoative Disorders, 26(3), 285-288.

Staley, D., & El-Guebaly, N. (1990). Psychometric properties of the Drug Abuse

Screening Test in a psychiatric patient population. Addictive Behaviours, 15(3), 257-264.

Thompson, J. P., Anglin, M. D., Emboden, W., & Fisher, D. G. (1985).

Mushroom use by college students. Journal of Drug Education, 15(2), 111-124.

Warren, C. W., Kann, L., Small, M. L., Santelli, J. S., et al. (1997). Age of initiating selected health-risk behaviours among high-school students in the United States. Journal of Adolescent Health, 21(4), 225-231.

Welte, J. W., & Barnes, G. M., (1985). Alcohol: The gateway to other drug use among secondary-school students. Journal of Youth and Adolescence, 14(6), 487-498.

Wiesbeck, G., Schickit, M., Kalmijn, J. A., & Tipp, J. (1996). An evaluation of the history of a marijuana withdrawal syndrome in a large population. <u>Addiction</u>, 91(10), 1469-1478.

Williams, R. (1999). Notes from a discussion with a prominent Calgary-based youth addiction researcher.

Williams, R. (2000). Notes from a discussion with a prominent Calgary-based youth addiction researcher.

Windle, M., Barnes, G. M., & Welte, J. (1989). Causal models of adolescent substance use: An examination of gender differences using distribution-free examinators. Journal of Personality and Social Psychology, 56(1), 132-142.

Yamaguchi, K., & Kandel, D. B. (1984). Patterns of drug use from adolescence to young adulthood. <u>American Journal of Public Health, 74(7)</u>, 668-680.

Yu, Y., & Williford, W. R. (1992). The age of alcohol onset and alcohol, cigarettes, and marijuana use patterns: An analysis of drug use progression of young

adults in New York State. International Journal of the Addictions, 27(11), 1313-1323.

Yu, Y., & Williford, W. R. (1994). Alcohol, other drugs, and criminality: A structural analysis. <u>American Journal of Drug and Alcohol Abuse</u>, 20(3), 373-393.

Zimbardo, P. G. (1992). <u>Psychology and Life 13<sup>th</sup> Edition</u>. New York: HarperCollins Publishing.

### APPENDIX A: The Drug Abuse Screening Test (DAST)

These questions refer to the past 12 months:	Circle You Response	r
1. Have you ever used drugs other than those required for medical reasons?	Yes	No
2. Have you abused prescription drugs?	Yes	No
3. Do you abuse more than one drug at a time?	Yes	No
4. Can you get through the week without using drugs?	Yes	No
5. Are you always able to stop using drugs when you want to?	Yes	No
6. Have you had "blackouts" or "flashbacks" as a result of drug use?	Yes	No
7. Do you ever feel bad or guilty about your drug use?	Yes	No
8. Does your spouse (or parents) ever complain about your involvement with drugs?	Yes	No
9. Has drug abuse created problems between you and your spouse or parents?	Yes	No
10. Have you lost friends because of your use of drugs?	Yes	No
11. Have you neglected your family because of your use of drugs?	Yes	No
12. Have you been in trouble at work because of drug abuse?	Yes	No
13. Have you lost a job because of drug abuse?	Yes	No
14. Have you gotten into fights when under the influence of drugs?	Yes	No
15. Have you engaged in illegal activities in order to obtain drugs?	Yes	No
16. Have you been arrested for possession of illegal drugs?	Yes	No
17. Have you ever experienced withdrawal symptoms (felt sick) when y stopped taking drugs?	rou Yes	No
<ol> <li>Have you ever had medical problems as a result of your drug use (e. memory loss, hepatitis, convulsions, bleeding, etc.)?</li> </ol>	g. Yes	No
19. Have you gone to anyone for help for a drug problem?	Yes	No
20. Have you been involved in a treatment program specifically related to drug use?	Yes	No

### APPENDIX B: Personal Drug Use Inventory

### QUESTIONNAIRE #2: PERSONAL DRUG USAGE INVENTORY

;

### 2. Sex: Male, Female. Circle one.

Ethnicity: White, African American, Asian, Aboriginal, other \_\_\_\_\_. Circle One.
 Last grade Completed:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, Community College, University Undergraduate, University Masters, University Ph.D. Circle One.

### DRUG USAGE HISTORY

Please list the following classes of drugs in the order that you tried each drug for the very first time. Leave blank any drugs that you have not ever tried. In the second space, please indicate how old you were when you first tried each drug.

INHALANTS: (Nitrous Oxide, Sniffing glue,	ORDER TRIED	AGE WHEN FIRST TRIED
inhaling adhesives, cleaning fluids, etc.)		<u> </u>
ALCOHOL: (Beer, Wine, Spirits, Hard Liquor, etc.)		
OPIATES: (Heroin, Morphine)		
PCP: (ANGEL DUST)	<u></u>	
COCAINE (not including crack)		
MARLIUANA/HASHISH		
TRANQUILIZERS: (Sleeping Pills, Valium, etc.)		
CIGARETTES/CHEWING TOBACCO		<del></del>
HALLUCINOGENS: (LSD, magic mushrooms, Ecstasy)		
AMPHETAMINES: (Speed, Ritalin, Benies, Dexies, Crystal, Go fast)		
PRESCRIPTION OPIATES: (Demerol, Codeine, Talwin, Stadol, Dilaudid, etc.)		
CRACK COCAINE	·	· · · · · · · · · · · · · · · · · · ·
OTHER: list		
OTHER: list		· · · · · · · · · · · · · · · · · · ·

<sup>1.</sup> Age\_\_

(peak usage).						-	
2. In section two, please indicate how often you used the dru $0 = never$ , $1 = yearly$ , $2 = every 2-3$ months, $3 = once a m$	ug at its peak u onth, 4 = 2-3 t	sage (when yo imes a month,	u used it r 5 = week	nost) by circli ly, 6 = daily,	ng the appr 7 = scveral	opriate r times a c	ssponse: lay.
<ol><li>In section three, using the same format as in column two</li></ol>	, please indicat	te your current	t usage of e	ach particula	r drug by ci	rcling th	e appropriate
response. AGE AT PE (when you used the d (section	AK USE (ug the most): one)		AMOI	UNT USED / (section 2)	T PEAK		
INHALANTS: (Nitrous Oxide, Sniffing glue, spray paint, typewriter correction fluid,	Never 0	Every 2-3 Months 1	Once a Month 2	2-3 Times a Month 3	Weekly 4	Daily 5	Several Times a Day 6
Inhaling adresives, cleaning rules, ever,	0	-	2	6	4	2	9
ALCURIOL. (Deci, Mire, Janus, mer and ALCURIOL. (Decin Morphine)	0	-	2	~ ,	4	~	6
PCP: (ANGEL DUST)	0	-	2	3	4	5	é
COCAINE (not including crack)	0	_	2	3	4	2	9
MARIJUANA/HASHISH	0	_	2	3	4	γ '	9
TRANQUILIZERS. (Sleeping Pills, Valium, etc.)	0	-	2	e	4		0
CIGARETTES/CHEWING TOBACCO	0	-	2	~	4		

.

# QUESTIONNAIRE #3: PERSONAL DRUG USAGE INVENTORY

•

1. There are three sections to be filled out below In the first column, please indicate the age you were when you used each drug the most

-. -

-

-

### **PERSONAL DRUG USE INVENTORY**

HALLUCINOGENS: (LSD, magic mushrooms, Ecstasy)		0	1	2	3	4	5	6
AMPHETAMINES: (Speed, Ritalin, Benies, Dexies, Crystal, Go fast)	<u></u>	0	1	2	3	4	5	6
PRESCRIPTION OPIATES: (Demoral, Codeine, Talwin, Stadol, Dilasudid, etc.)	<b></b>	0	1	2	3	4	5	6
CRACK COCAINE		0	1	2	3	4	5	6
OTHER: list		0	l	2	3	4	5	6
OTHER: list		0	I	2	3	4	5	6

### CURRENT USE: How often do you use each drug now? (Section three)

	Never	Every 2-3 Months	Once a Month	2-3 Times A Month	Weekly	Daily	Several Times A Day
INHALANTS: (Nitrous Oxide, Sniffing Glue, Spray Paint, Typewriter correction fluid, inhaling adhesives, etc.)	0	1	2	3	4	5	6
Alcohol: (Beer, Wine, Spirits, Hard Liquor, etc.)	0	l	2	3	4	5	6

	Never	Every 2-3 Months	Once a Month	2-3 Times A Month	Weekly	Daily	Several Times A Day
OPIATES: (Heroin, Morphine)	0	. 1	2	3	4	Ś	Q
PCP: (Angel Dust)	0	-	2	3	4	5	9
COCAINE	0	I	2	3	4	Ç	6
MARIJUANA/HASHISH	0	-	2	3	4	5	6
TRANQUILIZERS	0	-	2	3	4	5	9
CIGARETTES/CHEWING TOBACCO	0	_	2	3	4	5	9
HALLUCINOGENS: (LSD, magic mushrooms, Ecstasy)	0	-	2	3	4	5	6
AMPHETAMINES: (Speed, Ritalin, Benies, Dexies, Crystal, Go Fast)	0	1	2	3	4	5	6
PRESCRIPTION OPIATES: (Demoral, Codeine, Talwin, Stadol, Dilaudid, etc.)	0	-	2	3	4	S	6
CRACK COCAINE	0	-	2	3	4	S	ó
OTHER: list	0	-	2	3	4	5	6
OTHER: list	0	-	2	3	4	s.	6

•

98
APPENDIX C: Poster to Solicit Volunteers

# Volunteers Needed for Research Project:

If you are between the ages of 18-30 and would like to participate in an anonymous survey on personal drug use, please fill in the questionnaire provided in the envelopes next to this poster.

The purpose of this study is to assess the typical progression of hard drug use.

As part of the study, you will be asked to fill out questionnaires (takes approximately 10 minutes) regarding drug use patterns, and questionnaires are to be sealed and returned to myself via mail (address, postage, and envelope enclosed).

This study is being conducted by Kelly Moroz, a graduate student in the department of Educational Psychology, at the University of Calgary. I am conducting a research project under the supervision of Dr. L. Sandals, as part of the requirements towards a Master of Science degree.

Thank you for your time.

## Appendix D: Cover Letter for Downtown Volunteers

## Cover Letter

## Dear Participant

My name is Kelly Moroz. I am a graduate student in the department of Educational Psychology at the University of Calgary, conducting a research project under the supervision of Dr. I. Sandals, as part of the research requirements towards a M.Sc. Degree. I am writing to provide information regarding my research project: **Drug Use: Initiation and Progression** so that you can make an informed decision regarding your participation.

The purpose of the study is to assess whether drug use follows a predictable sequence, and to determine the effects of the date of drug use initiation on later drug use and lifestyle. As part of the study you will be asked to fill out three questionnaires regarding drug use patterns, and questionnaires will be placed in a sealed envelope and returned to the researcher via mail (**pre-addressed**, **and postage provided**). These questionnaires will take approximately five to ten minutes each (total = ten to twenty minutes), and may be filled out in the privacy of your home, etc. You should be aware that even if you begin to fill out the questionnaires, you are free to withdraw at any time without penalty.

Participation in this study will involve no greater risks than those experienced in daily life.

Data will be gathered by the researcher in a way that ensures anonymity. Aside from some personal information, no names are to be printed on the questionnaires. The researcher will collect the mailed envelopes and take them to the office of the researcher, where they will be combined with approximately 500 other questionnaire packets. The questionnaires will be kept in a locked file in the researcher's office, and all data will only be accessible to the researcher. All questionnaires will be stored for two years following completion of the study. At this point in time, all questionnaires will be destroyed.

If you have any questions, please feel free to contact me at 220-7964, my supervisor, Dr. Lauren Sandals, at 220-4625, the office of the chair, faculty of Education Joint Ethics Review Committee at 220-5626, or the Vice-President (Research) at 220-3381. One copy of the consent form is provided. Please retain this for your personal records.

Thank you for your cooperation.

Sincerely,

Kelly Moroz

# APPENDIX E: Cover Letter for Inmates

# Cover Letter

#### Dear Participant

My name is Kelly Moroz. I am a graduate student in the department of Educational Psychology at the University of Calgary, conducting a research project under the supervision of Dr. I. Sandals, as part of the research requirements towards a M.Sc. Degree. I am writing to provide information regarding my research project: Drug Use: Initiation and Progression so that you can make an informed decision regarding your participation.

The purpose of the study is to assess whether drug use follows a predictable sequence, and to determine the effects of the date of drug use initiation on later drug use and lifestyle. As part of the study you will be asked to fill out three questionnaires regarding drug use patterns, and questionnaires will be placed in a sealed envelope and returned to the programs supervisor (Barb Blanchette), who will store them in a locked cabinet until picked up by the researcher. These questionnaires will take approximately five to ten minutes each (total = ten to twenty minutes), and may be filled out at leisure (in the privacy of your cell, etc.). You should be aware that even if you begin to fill out the questionnaires, you are free to withdraw at any time without penalty.

Participation in this study will involve no greater risks than those experienced in daily life.

Data will be gathered by the researcher in a way that ensures anonymity. Aside from some personal information, **no names are to be printed on the questionnaires**. The researcher will collect the envelopes and take them to the office of the researcher, where they will be combined with approximately 500 other questionnaire packets. The questionnaires will be kept in a locked file in the researcher's office, and all data will only be accessible to the researcher. All questionnaires will be stored for two years following completion of the study. At this point in time, all questionnaires will be destroyed.

Thank you for your cooperation.

Sincerely,

Kelly Moroz

# APPENDIX F: Cover Letter for University Volunteers

# Cover Letter

# Dear Participant

My name is Kelly Moroz. I am a graduate student in the department of Educational Psychology at the University of Calgary, conducting a research project under the supervision of Dr. l. Sandals, as part of the research requirements towards a M.Sc. Degree. I am writing to provide information regarding my research project: **Drug Use: Initiation and Progression** so that you can make an informed decision regarding your participation.

The purpose of the study is to assess whether drug use follows a predictable sequence, and to determine the effects of the date of drug use initiation on later drug use and lifestyle. As part of the study you will be asked to fill out three questionnaires regarding drug use patterns, which will take approximately five to ten minutes each (total = ten to twenty minutes). Questionnaires will be returned to the researcher in provided sealed envelopes (via campus mail) within one week. These sealed envelopes, because of the use of campus mail, **do not require any postage**. Return these sealed envelopes to the secretary in your department, and she will ensure that it is sent to the department of Educational Psychology. Alternatively, packets may be placed in campus mail chutes, located in various school locations. You should be aware that even if you begin to fill out the questionnaires, you are free to withdraw at any time without penalty.

Participation in this study will involve no greater risks than those experienced in daily life.

Data will be gathered by the researcher in a way that ensures anonymity. Aside from some personal information, no names are to be printed on the questionnaires. Students are to fill out the questionnaires at leisure within one week. The researcher will collect the mailed envelopes and take them to the office of the researcher, where they will be combined with approximately 500 other questionnaire packets. The questionnaires will be kept in a locked file in the researcher's office, and all data will only be accessible to the researcher. All questionnaires will be stored for two years following completion of the study. At this point in time, all questionnaires will be destroyed.

If you have any questions, please feel free to contact me at 220-7964, my supervisor, Dr. Lauren Sandals, at 220-4625, the office of the chair, faculty of Education Joint Ethics Review Committee at 220-5626, or the Vice-President (Research) at 220-3381. One copy of the consent form is provided. Please retain this for your personal records.

Thank you for your cooperation. Sincerely,

Kelly Moroz

# APPENDIX G: Consent Form

# CONSENT FOR RESEARCH PARTICIPATION

I hereby give my consent to participate in a research project entitled: Drug Use: Initiation and Progression.

I understand that such consent means that I will fill out three questionnaires on personal drug use patterns, which will require ten to twenty minutes of my time.

I understand that participation in this study may be terminated at any time by my request or the request of the investigator. Participation in this project and/or withdrawal from this project will not adversely affect me in any way.

I understand that the responses will be obtained anonymously and kept in strictist confidence.

I understand that only group data will be reported in published reports.

I have been given a copy of this consent form for my own records. I understand that if I have any questions I can contact the researcher at 220-7964, my supervisor, Dr. Lauren Sandals, at 220-4625, the office of the Chair, Faculty of Education Joint Ethics Review Committee at 220-5626, or the office of the Vice-President (Research) at 220-3381.