UNDERSTANDING ADOLESCENT CANNABIS USE:
A STRESS PROCESS MODEL APPLICATION

by

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A thesis submitted in conformity with the requirements
for the degree of Doctorate of Philosophy
Graduate Department of Sociology
University of Toronto

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0-612-59074-7
Abstract

Cannabis use remains an unresolved social problem in Canada. Widespread adolescent cannabis use is a particularly troublesome reality both in terms of criminal labelling and possible adverse health effects. The empirical focus of this research is to develop an understanding of factors that predict differential levels of cannabis use. Particular attention is devoted to adolescents who use cannabis at problem levels. This research is set in the context of the criminal and health related consequences associated with cannabis use. The historical background of cannabis prohibition is reviewed and the literatures on social, health and legal impacts are summarized. Within this backdrop, the conceptual framework is guided by the stress process model situating a criminalized behaviour within a health oriented framework. In addition to estimating the effects of individual family and school stressors this research evaluates the effects of cumulative stressors on cannabis use. While much attention has been given to the association between formal social control and cannabis use, the influence of
various social relationships (informal social control) on this behaviour remain largely unexplored. A particular contribution of this research is evaluating the extent to which informal social control influences cannabis use patterns among adolescents. Finally, policy implications and future research directions are discussed.
Acknowledgements

I would first like to thank the Centre for Addiction and Mental Health: Addiction Research Foundation Division for granting me access to the data utilized in this thesis. I would also like to thank Dr. Garth Martin as Director of the Alcohol, Tobacco and Other Psychoactive Substances Program (ATOPS). In addition to the fellowship support I received through the ATOPS program, Garth your contribution to my thesis defence was greatly appreciated.

A very sincere thank you must go to each of my committee members. Dr. John Hagan who's initial insights and contribution set this process in motion, thank you. Dr. Edward Adlaf, in addition to providing me with the Ontario Student Drug Use Survey data your support, patience and input into this thesis was invaluable. I have learned more from you over these past few years than any text book could ever teach me.

I will never be able to express my deep gratitude to Dr. Rosemary Gartner. Rosemary, I can only hope you know how much I value all you have given me over these past few years. The enthusiasm and encouragement you have shown me, not only through this process, but in all other areas of my life means so much.

To the other members of my thesis defence committee I also thank you. Dr. Kenneth Allison, your comments and observations into the central issues of my thesis were extremely valuable. To my external examiner, Dr. Richard Clayton, I cannot articulate the extent of my gratitude. Not only do I greatly appreciate you taking the time to be a part of the defence process but you have challenged me to think beyond the thesis and have given me the direction to do so.
To all of my friends at the Department of Sociology, at The University of Toronto, thank you for the laughs, The Social Animals, and your friendship. I am so glad you all came into my life. A very special thank you must go to Jeannette Wright. Jeannette you have a special gift for making each student feel like they are the only one in the department. Your dedication to the students in general, and myself in particular, is truly remarkable and I thank you for all you have done for me over the years.

There are two people who deserve more than a special mention - Myrna and Wendy. My fellow angels, there is no way I will every be able to convey how much you mean to me. We travelled this road together, sharing in each others joys and accomplishments and helping to hold each other together when falling apart seemed inevitable. You prop me up when my courage starts to fade and walk beside me when I could use a little guidance and direction in my life. I never would have made it without you and it certainly would not have been half as much fun. I have a feeling our adventures have just begun!

To my supervisor, mentor and friend, Dr. Patricia Erickson. This has been quite a journey and there are no words that will adequately express how much I appreciate all you have done for me. I would not be here without you and I know you know that. Your encouragement, guidance but most importantly your friendship have meant and will always mean the world to me. You challenge me to be my best and provide me with so many opportunities to grow. For this and so much more, thank you. I look forward to many more years of collaboration and a lifetime of friendship.

I am not sure how you thank your family for a lifetime of love and unfailing support and I know these words will not be enough. You have stood by me through all of the ups and
downs, not only of graduate school, but life in general. You taught me to “read the questions carefully, think before you answer and answer what you know how to do best first.” You have supported my decisions, offered direction when I needed it and have surrounded me with warmth, laughter and the knowledge that doing my best is always good enough. You mean the world to me.

Finally, my husband Dan. Your support, encouragement and understanding have been my rock. Your love keeps me grounded, reminds me of what is really important and sharing my life with you means more than you know - I could not ask for more. I love you.

Martha, Jane and the many others who have stood by me, there is not enough space to thank you all but you know who you are. My life has been greatly enriched by the friendships that surround me and those friendships are by far the greatest and most treasured gifts I have ever received. My love and thanks always.
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Chapter 1

Setting the stage: Cannabis as a persistent social problem

1.1. Introduction

Understanding youth deviance has been a central goal of much sociological research and theory since the early work of Shaw and McKay (1942; 1969) in the 1920s and 1930s. However, it was not until the later 1960s that cannabis use was included among the many potential and actual law-breaking acts by youth. Since that time it has received considerable research attention as a widely practised form of youth deviance.

The social construction of drug use as deviant created a new class of marginalized lifestyles contributing to the expectations of how people should live and not live their lives (Butters and Erickson, 1999). During the last three decades of cannabis research, much has been learned about general patterns of initiation and experimentation. In Canada, over four million people are estimated to have used cannabis in their lifetime. For many of these individuals, ‘casual’ cannabis use has been well integrated into patterns of everyday life similar to the consumption of alcohol and tobacco products. In fact, cannabis use is primarily a recreational activity, that is, a means through which some people intensify enjoyable experiences (Goode, 1993).

Cannabis use has become not only more normative in terms of prevalence but also with respect to societal perceptions. There has been a growing trend in Canadian society that reflects a greater acceptance or tolerance of cannabis use (Savas, 1998). However, this positive shift in attitudes has primarily focused on adult use. Strong disapproval toward
adolescent cannabis use is still evident. The successful negotiation of adolescence as a life stage has significant implications for success in adulthood and therefore any potential threats to this development are met with significant adult disapproval and low tolerance. Cannabis use is one such perceived threat. Indeed, in spite of a movement toward tolerance, the official policy response to cannabis use by youth continues to rely on the criminalization of cannabis and the presumed (though largely undemonstrated) deterrent effect of legal threat.

Despite the accumulation of cannabis research, the social factors that influence varying degrees of cannabis use, and the most intensive users in particular, have been relatively neglected. While most cannabis users do not consume in excessive quantities, recent survey data in Ontario suggest a trend toward increased use (Adlaf, Ivis, and Smart, 1997). There was a statistically significant increase in the percentage of students using 40 or more times a month between 1989 and 1995 (from 9.7% to 19.4%)(Adlaf et al., 1997). Moreover, there appears to be an increase in the number of students who report outcomes indicative of cannabis dependence (i.e. uncontrolled use, sustained use or unsuccessful attempts to reduce consumption). Therefore, although it is still the case that only a minority of adolescents are using cannabis at these higher levels, this group of young people does appear to be growing.

While there are several theories about adolescent drug use in sociology, the relationship between the experience of stress and drug use has not, until recently, been given much attention. The perspective articulated in the psychological literature, suggests that substance use (including cannabis) will increase under stress due to its perceived ability to regulate negative affect (Wills, 1986; Wills and Shiffman, 1985). This argument suggests that the coping function provided by substance use is the reduction of stress. Adolescence can be
a generally stressful period of life. The acquisition of new responsibilities, seeking an identity separate from one’s parents and the increasing importance of peers may contribute to the experience of stressful situations. It is this relationship between stress and cannabis use that will be evaluated in this thesis.

Understanding use and particularly problem-level cannabis use among adolescents is important at the individual level for at least two reasons: the potential adverse health effects and the risk of criminal stigma. Each poses serious potential life-course implications. While the long-term health consequences are not yet fully understood\(^1\), the consequences associated with the illegal status of the drug which may have harmful effects on development across the life course are well documented (Becker, 1963; Erickson, 1980; Single, 1980; Solomon, 1980; Warner, Fischer, Albanes and Amitay, 1999). Because cannabis use among adolescents persists despite legal threats and widespread criminalization, understanding the socio-cultural stressors that contribute to use and problem use is an important research goal.

An equally important issue that has received less attention is understanding why the majority of adolescents\(^2\) still do not use cannabis. Based on 1999 statistics, only 34.7 percent of students in Ontario report cannabis use during their lifetimes (Adlaf, Paglia and Ivis, 1999). In a more tolerant climate with high levels of availability, one might expect a significant increase in the proportion of adolescent cannabis users; however, this does not appear to be

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1 The health effects literature will be examined later in more detail.
2 The data used in this thesis reflects the self-reported behaviour of adolescent students in the province of Ontario. My use of the term adolescents therefore is not meant to generalize to all adolescents. There are certain groups of young people not represented in these data and this is discussed in Chapter 3. However, in the province of Ontario mandatory school attendance is required until 16 years of age and even then youth are more likely to remain in school.
the case. Some individuals may attribute this to the success of deterrence. Attempts to evaluate and understand the actual impact of criminalization have resulted in a large body of research illustrating that a number of other social control processes may, in fact, have a more substantial impact. While research has typically concentrated on formal social control mechanisms (i.e. laws), informal social control inherent in social relationships (i.e. family and peers) also has the potential to influence behaviour. As shall be discussed later in this chapter, with the limited deterrent effect of legal sanctions and an already overburdened legal system, the impact that informal social controls may have on youth is important; however, it has received little empirical attention.

With these issues in mind, this thesis focuses on two central research questions. First, does experiencing stress, either within the family and/or the school influence differential cannabis use among adolescents? Second, what role does informal social control play as a resource that may influence different levels of cannabis use among adolescents?

To examine these issues, I first estimate the effects of various stressors and informal social control on the probability of being an abstainer versus user. Then I move beyond the ‘use’ versus ‘no-use’ dichotomy and the isolation of only the ‘heavy users’, and provide a with-in user comparison to elucidate the processes involved in predicting problem cannabis use. In this thesis, the designation “problem cannabis use” is based on a composite measure of the reported frequency and quantity of cannabis use as well as a measure of self-reported problems with use\(^3\).

\(^3\) The operationalization of this measure is described in detail in the Methods (Chapter 3; pages 71 - 104) chapter of this thesis.
The next section of this chapter provides a brief discussion of the relationship between delinquency and stress. Because adolescence is characterized by an increase in the experience of stress and is also the time of elevated cannabis consumption, this provides an opportunity to estimate the role of stressors and informal social control in predicting differential cannabis use. Because the law prohibiting cannabis remains the predominant prevention approach to adolescent cannabis use, the second portion of this chapter reviews the social construction of cannabis use as a deviant behaviour within the historical development of Canada's narcotic legislation. I will argue that the reliance on a strict prohibitionist approach is not without its consequences. Therefore the personal and social costs must be weighed against the benefits of deterrence. In doing so, I conclude that the deterrent effect of cannabis legislation is not worth the costs and present a discussion of informal social control and the possible role this plays in regulating the consumption of cannabis.

1.2. Adolescence: Stress and delinquency

Researchers in many disciplines have been interested in understanding how different sources of stress translate into psychological distress, symptoms of psychiatric disorder or other types of social dysfunction. Although various stress models have been developed, the general proposition is that social and psychological sources of stress influence health outcomes (Avison and Gotlib, 1994). Based on over two decades of research, there is little doubt that the strains and stressors individuals experience act as etiological factors for various health outcomes and that this relationship is influenced by different psychosocial resources.

The particular pathway I am examining in this thesis is how the experience of stress
translates into different levels of cannabis use among adolescents. During adolescence young people begin to take on additional responsibilities in the home and at school. These changes can result in an increased number of potentially stressful experiences (Hoffman, Levy-Shiff, Sohlberg and Zarizki, 1992) associated with the management of new responsibilities and broader social networks. Further, adolescents are generally a more introspective group with a self-directed view of the social world in which they live; therefore perceived stress is also greater during this life stage (Compass, Orosan and Grant, 1993; Hoffman and Cerbone, 1999).

Although the experience of a single stressor may increase the probability of drug use, some adolescents are at an even greater risk for drug use and problem drug use because they experience multiple stressors. Both mental health and addiction researchers suggest that the experience of cumulative stressors may increase the likelihood of drug use (including cannabis) (Agnew and White, 1992; Clayton, 1992; Hoffman and Miller, 1998; Hoffman and Su, 1997; Su, Hoffman, Gerstein and Johnson, 1997). Therefore, adolescents who experience multiple problems in their social environments (i.e. family and school) may be more likely to turn to cannabis use as a means of escape or to cope with their stress. To explore this issue further, this thesis also provides a specific analysis of the relationship between the experience of cumulative stressors and cannabis use.

To manage the experience of stress, then, the individual must go through a process of adaptation⁴. Adolescence is a more stressful time for some than others. Those who are ill prepared to cope with the increased burden of stress may express their frustration and anger

⁴ The relationships that underlie the stress process model are discussed in Chapter 2.
through participation in delinquent behaviours, including drug use (Agnew, 1992; 1997; Attar, Guerra and Tolan, 1994; Guerra, Huesmann, Tolan and Van Acker, 1995). However, not all adolescents who are exposed to stressful environmental situations engage in delinquent and potentially health-compromising activities such as cannabis use. This suggests the presence of factors that may condition the negative effects of stressors. Understanding why those adolescents who are exposed to stress yet either refrain from cannabis use or control their use at non-problematic levels is a central research question of this thesis. The answers may suggest possible intervention strategies which are more fruitful than the reliance on legal threats.

This thesis, then, provides a unique opportunity to examine whether and to what extent the experience of stress within family and school contexts influences cannabis use and to what extent this relationship is affected by the presence of personal resources. Adolescence represents a formative stage in the life cycle; therefore, problems encountered during this time may have significant long-term implications. This notion is discussed in greater depth in the next section of the chapter.

1.3. The importance of adolescence

Human development is an unfolding process, influenced by the various opportunities, interests, demands and events individuals experience as they age (Baltes, 1987). Throughout the life course, individuals experience sequences of long term, age-graded patterns of development referred to as trajectories that are tied to central institutions such as the family, school and occupation (Thornberry, 1997). These trajectories are associated with different
statuses and with subsequent expectations and roles that are placed on, and held by, the individual. Along with these longer term trajectories individuals also experience different transitions as they move through the life span. Transitions include such shorter term events as graduation, a first job, getting married, or retirement. These short-term changes in the life course, however, have longer term implications, as their order and timing are associated with the successful or unsuccessful completion of various developmental tasks.

Although it has been established that developmental transitions have the potential to affect deviant behaviour, this relationship is bidirectional and deviant behaviour may in turn affect the success of developmental transitions (Hagan and Palloni, 1988; Newcomb and Bentler, 1988; Sampson and Laub, 1993; Thornberry, 1987). It is this latter association I explore in this thesis.

Deviant behaviours may affect the transition from adolescent to adult roles and statuses because adolescents engaging in these activities may be more likely to experience premature or disorderly transitions. These early or unsuccessful transitions in one area do not occur in a vacuum and therefore have consequences for other trajectories and may contribute to the continuation or escalation of deviant behaviours (Elder, 1994; Newcomb and Bentler, 1988; Sampson and Laub, 1993).

The adolescent years represent a transition from junior to senior high school and are regarded as an important, often stressful developmental period that presents young people with new developmental tasks consisting of cognitive, social, emotional and physical growth (Dreher and Oerter 1986; Havighurst 1982; Scheier, Newcomb and Skager 1994). Given the importance of learning how to manage these new developmental tasks, interruptions brought
on by drug use may be particularly damaging.

While research shows that experimentation and social use of marijuana may not significantly impede transition into adult roles, the consequences of chronic or problem cannabis use are less well understood and remain a potential threat in the form of health and legal consequences. Adolescent drug use is associated with an elevated probability of early exits from adolescent roles and into adult roles without the proper preparation (Hagan and Wheaton 1993; Newcomb and Bentler 1988). The life course perspective suggests that early deviant behaviour, including drug use, sets in motion a succession of events. These events not only have the potential to decrease the likelihood of later life successes but may in fact foster, and increase, the probability of continued participation in deviant behaviour, including drug use (Hagan and McCarthy, 1997; Krohn, Lizotte and Perez 1997; Sampson and Laub, 1993).

Considering the importance of adolescence as a life-stage for future development, understanding why adolescents engage in a potentially stigmatizing and health compromising behaviour such as drug use is an important question. Many theories and propositions concerning why adolescents use drugs have been developed and are entrenched in the deviance literature. I argue, however, that insight into these relationships may also be gained by adopting a framework that examines cannabis use as an outcome of the experience of stress. Adolescence is characterized by the escalation of delinquent behaviours, including cannabis use (Blumstein, Cohen, Roth and Visher, 1986; Chen and Kandel, 1998; Farrington, 

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5 This is not to say that the threat of arrest and associated consequences are not a possibility for those who are social users; rather prolonged and problem level use are significantly more likely to interfere with the transition from adolescent to adult roles than is casual use.
1986; Kandel and Logan 1984; Newcomb and Bentler 1986a) as well as an elevated potential for the experience of stressful life events (Eccles, Midgley, Wigfield and Rueman, 1993; Hoffman et al., 1992; Peterson, Kennedy and Sullivan, 1991). The co-existence of these trends in adolescence suggests a potential relationship between the two and is evaluated in this thesis.

As mentioned, the consequences of cannabis use are at least two-fold, health risks and the impact of criminalization. Prior to considering the consequences associated with the criminalization of cannabis, the following section of this chapter discusses the health implications of cannabis use. Even if cannabis was legalized, there are health implications associated with use, and in particular with problem level use. Moreover, as with alcohol, legislation is likely to impose age restrictions that will continue to present some barriers to legal access. Thus, while the life course of an adolescent may be interrupted by the experience of criminal prosecution, so to may the successful transition of the stage be compromised by health related concerns.

1.4. Health implications of cannabis use for adolescents: Disruption of the life course

In spite of the research examining health effects of cannabis use, much remains uncertain about these consequences. Understandably, the assessment of the health hazards associated with any drug poses substantial difficulties. The effects of use on health depend not only on the use of the particular drug (in this case cannabis), but on a variety of other factors that makes establishing a causal relationship between cannabis use and chronic health
outcomes challenging⁶.

However, in spite of this, a number of potential health effects have been identified. The purely physical acute effects of marijuana that have been established empirically are a reddening of eyes, dryness of the mouth and an increase in heart rate. When considering the adolescent population, however, the most threatening and dangerous acute effect of cannabis use may be the deterioration of motor-coordination. The greater the unfamiliarity and complexity of the task, the higher the level of intoxication and the more inexperienced with marijuana the greater the degree of dis-coordination (Canadian Commission of Inquiry into the Non-medical Use of Drugs, 1972; WHO Report, 1997). This risk is particularly salient for adolescents as this is also the age at which they may attain a driver’s licence. While the risk for motor vehicle accidents associated with cannabis use is not restricted to adolescents, and this threat is elevated for any level of use, the combination of the novelty of driving and the relative lack of experience, and the presence of multiple, distracting passengers, all place adolescents at an even greater risk⁸.

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⁶ The acute effects of cannabis use are influenced by the mode of administration, dose, prior drug use experience, mood, expectations and concurrent drug use (WHO Report, 1997). Moreover, there is often a lengthy interval between use and visible effects on health. In addition, the most rigorous studies involve controlled laboratory experiments conducted on animals making the relevance of these findings questionable (Hall, Solowij and Lemon, 1994). Finally, tracing the effects is complicated by the fact there are very few “marijuana only” drug users. This makes the identification of the effects solely attributable to marijuana very difficult.

⁷ These findings have been confirmed in driving experiments, tests on pilots and autopsy studies of people killed in motor vehicle accidents.

⁸ A recent review of evidence regarding the role of cannabis in motor vehicle accidents (Bates and Blakely, 1999) provides further elaboration on this relationship and highlights the role of cannabis alone in comparison to the combined effects of cannabis and alcohol.
The chronic effects of marijuana have also received much research attention. One effect that has not been seriously challenged is that chronic use of marijuana is related to an impairment in the functioning of the lungs (Morris, 1985). This finding is not particularly surprising as marijuana is typically smoked and is inhaled more deeply and held longer in the lungs than cigarette smoke. In fact when smoked in the same way, marijuana produces twice as much tar as tobacco produced by cigarette smoking (Rocket, Robinson and Rogers, 1982).

Furthermore, delta-9-tetrahy-drocannabinol (THC) is the primary psychoactive agent in marijuana. Unlike other drugs such as alcohol that pass through the body quickly, THC is stored in the body’s fatty tissue for longer periods of time. This slower elimination has lead some researchers to suggest that regular use may result in the storage or accumulation of THC that may be medically harmful to the user (Goode, 1993).

The following section of this chapter provides a brief review of the history of cannabis legislation in Canada. This will set the context within which the consequences of cannabis criminalization are discussed from a life course perspective.

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10 The half life of THC, that is the period of time after use when the chemical is still present in the blood is 19 hours but the metabolic half life is 50 hours. After one week, 25% of THC metabolites remain in the body (Ray and Ksir, 1990).
11 This is not a unanimous conclusion of researchers in the area; the research by Zimmer and Morgan (1997) disagree with this argument.
1.5. From crime to (almost) a disreputable pleasure: The history of cannabis legislation

According to the interactionist perspective on deviance, morality is not an absolute, but rather a product of the process of social construction. Deviance then, is the result of the ‘claims-making’ of certain groups (Becker, 1963). These groups, typically those with power, make assertions regarding the acceptability of certain behaviours based on particular values and personal interests. Defining behaviours as social problems then is the outcome of processes governed by the economic, social and political contexts of a particular time and place.

Meaning is central to human experience and is socially created by those who have more power to define what is true than others (Goode, 1972). The concept ‘drug’ is a social fabrication reflecting moral and ideological assumptions, “something that has been arbitrarily defined by certain segments of society as a drug” as opposed to a medicine (Goode, 1993: 37). Drugs, then, are labelled as good/bad or acceptable/unacceptable and laws reflect this division.

In Canada, prior to the 1960s marijuana use was localized in larger urban areas (i.e., Montreal, Vancouver and Toronto) that were able to sustain small deviant drug using-subcultures (Blackwell, 1988). Users primarily clustered in fringe groups of society identified as “swingers”, “beats” and “squares”.

Most of the Canadian public had little or no contact

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12 What is ‘reasonable’ generally reflects that which is socially approved (Goode, 1972). Conversely, something defined as irresponsible is typically that which is “potentially disruptive to existing social arrangements and privileges” (pg.9) and is therefore disapproved of by more privileged members of society.

13 “Swingers” referred to entertainers, criminal or those on the fringes of subcultures. “Beats” were bohemians under the age of twenty five and “squares” were the well
with cannabis use or users prior to this time (Alexander, 1990; Solomon, Single and Erickson, 1988). In the 1960s, however, marijuana use began to spread from these subcultures to universities, colleges and younger individuals in general. At this time, cannabis was associated with rebellious youth who were rejecting and challenging parental authority and the societal ethic of productive labour (Boyd, 1991). By the mid-1970s, North American society witnessed a rapid increase in the prevalence of cannabis use. Although the continued diffusion of cannabis use into the more mainstream population has meant this behaviour is no longer seen as a deviant subcultural phenomenon (Hathaway, 1997), it continues to be labelled deviant by powerful individuals and institutions.

Extensive reviews of narcotic legislation in Canada are presented elsewhere (Cook, 1969; Giffen, Endicott and Lambert, 1991; Solomon and Green, 1980). The purpose of this discussion is to outline a brief overview of the legislation as it pertains to cannabis.

In 1922, Judge Emily Murphy labelled marijuana a “new menace” in Canada. Although cannabis use was not identified as a significant problem in Canada, nor is it an opiate narcotic in the pharmacological sense, nevertheless, in 1923 cannabis was added to the schedule of prohibited drugs in the Opium and Narcotic Drug Act (Erickson, 1980). The penalties including a maximum seven year imprisonment for cannabis-related offences were identical to those provided for cocaine and opiate narcotics, and were the same for all types of offences (i.e., possession, cultivation, trafficking). This set the stage for the punitive response to the recent wave of use. Since the 1960s, as a result of the increasing numbers of users who were flooding the criminal justice system, two major changes have been made in narcotics educated professionals between thirty five and fifty years of age; the yuppies of that era.
legislation that affect cannabis possession offences.\textsuperscript{14}

From the mid-1970s to the present there has been much talk, but little action, with respect to modifying cannabis legalisation. In spite of the government-appointed Le Dain Commission (1972) recommendation that the possession of marijuana no longer be classified as a criminal offence, the strict prohibitionist policy remains. Indeed, our more recent cannabis legislation is little more than a re-named and expanded version of NCA still outlining harsh repression for cannabis offenses.

Under the current legislation, The Controlled Drugs and Substances Act (1997), possession of cannabis carries a maximum penalty of five years less a day as an indictable offense (without the option for a trial by jury). The identical punishment, as passed in the 1969, remains for summary convictions: a maximum fine of $1000 and/or six months imprisonment for first time offenders and a $2000 fine and/or one year sentence for subsequent charges (Fischer, Erickson and Smart, 1996). Possession of less than 30g of marijuana and 1g of hashish are punishable by six months imprisonment and/or a maximum $1000 fine under the summary offense. Finally, while under the NCA vigorous enforcement of cannabis prohibition was fostered by the considerable amount of freedom that was given to the police regarding their arrest procedures, the CDSA actually broadened the power of the

\textsuperscript{14} In 1969, the Narcotic Control Act (NCA) was amended to give the prosecutor discretionary power to treat a drug possession charge, including cannabis, as a summary offence. With this change, for first time offenders the maximum penalty for simple possession was a fine of $1000 and/or six months in jail and for subsequent offences the amounts doubled (Erickson, 1976; 1980). Later, in 1972, the Criminal Code was changed and a discharge provision was included in the sentencing options. This amendment allowed the judge, after a finding of guilt, to impose a ruling of an absolute or conditional discharge for simple possession of any narcotic (Erickson, 1976).
police by stipulating no warrant is necessary if "...by reason of exigent circumstances it would be impractical to obtain one" (Fischer et al., 1996).

In spite of the fact that many other countries (e.g., Spain, Italy, The Netherlands, Australia) have modified their stance on drug issues, Canadian drug policy, along with policy in the US, remains among the harshest (Erickson and Butters, 1998). Becoming a cannabis criminal has implications for anyone so labelled. However, as shall be elaborated in the following section of this chapter, the social and individual consequences of cannabis criminalization for young people are particularly salient in regards to their life course development.

1.6. The consequences of cannabis criminalization for youth

The adoption of an aggressive prohibitionist approach to cannabis use created a situation in which escalating numbers of new criminals, whose crime was simple possession of cannabis, were being processed through the criminal justice system. These criminalization initiatives affected the lives of many young people as a consequence of their arrest, criminal record and possible imprisonment.

Consequences for the User

The labelling perspective suggests that the ascription of an official deviant status has the potential to alter an individual's personal identity. According to Becker (1963) being caught and publicly identified as a deviant is the first step in a process that may contribute to the creation or exacerbation of a deviant self-image. This in turn increases the risk for a
further commitment to the deviant role. The reaction of others who may now relate to this person as if they have negative characteristics associated with the deviant status also reinforces this "spoiled identity".

Studies examining the effects of official labelling on self-identity have generated mixed results (Ageton and Elliot, 1974; Hepburn, 1977; Jensen, 1972; Siegal, 1975). Some studies find that official processing is related to a perception of oneself as a delinquent while others indicate that, regardless of official sanctioning, the mere participation in a deviant act affects self perception.

Research evaluating the implications of a criminal conviction for cannabis use or possession are also somewhat mixed and suggest that multiple factors are involved in the acquisition of a criminal identity (Erickson, 1980). In a study of 95 first time offenders convicted for cannabis possession, while initially the official labelling did not seem to result in the self-acquisition of a criminal identity, a year following their initial conviction 20% of the sample were found to self-identify as a criminal. This change was noted to be associated with subsequent law breaking activities and in cases where the individual believed their parents perceived them to be a criminal. Since young people are likely to be living at home, parental disappointment, punishment and family conflict can also pose real difficulties (Erickson, 1980). Family conflict arising when parents learn of the charge and/or the concerns pertaining to the knowledge that one's parents now think of them as a drug user have implications for self-identity as well.

There are substantial long-term consequences for later-life outcomes associated with being criminalized as a youth. While some research fails to find a direct effect of confinement
(see Sampson and Laub, 1993), other research suggest that the effects of confinement may be indirect in nature (Hagan and Palloini, 1990; Sampson and Laub, 1993). That is, the effects of confinement as a youth contribute to a cumulative developmental process that reproduces itself over time. Sampson and Laub (1993) describe this process as cumulative continuity. Cumulative continuity is generated by negative structural consequences of delinquency for life chances. These delinquent events in effect close doors to opportunities throughout adult development, including such things as stable employment, which are associated with explaining later crime. Thus, arrest and/or incarceration "mortgages" a youth's future, especially in those areas influenced by employment and education. Sampson and Laub (1993) clearly illustrate the deleterious effect that incarceration has on the trajectory of employment in adulthood.

Consequences for the Law

Given the potential for the perceived inappropriateness of cannabis prohibition, plus the discretionary application of sanctions, a further consequence of cannabis criminalization is a growing disrespect for the law among those prosecuted for possession (Erickson, 1980). This disrespect in turn may contribute to an erosion of respect for authority, and possibly the transference of disrespect to increased participation in other deviant behaviours, including an escalation of cannabis use.

Disrespect or hostile attitudes toward the law and its enforcers can be formed based on personal experiences when arrested (Erickson, 1980; Warner et al., 1998). In one recent study when students were asked what they perceived to be the motivation behind the
confiscation of cannabis by the police, the general response was that the police took it for their own personal use:

"They might take it from you and smoke it themselves"

"Cops smoke it, like, if there's ...a van full of weed or something, you can't tell me that they don't take bricks of that... and then, like all the rest of the cops...have it down their pants or something" (Warner et al., 1998)

These comments reveal the perception that the police may have the same values or participate in the same behaviours as the young people they are to control. This may, in turn, diminish the moral authority of and respect for the police (Warner et al., 1998).

A second issue concerning disrespect relates to the law in general. It is possible to have disrespect for a specific law yet maintain respect for the law in general. However there is some question as to whether younger adolescents, including those who are not offenders, do and/or can differentiate between their beliefs regarding cannabis laws and the relative seriousness and punishment of other offenses (Erickson, 1980). If these distinctions become blurred because of the general disrespect for cannabis legislation, it is possible that participation in other delinquent activities, in addition to cannabis use, will increase.

There are, therefore, numerous potentially harmful consequences of the criminal conviction of young people for marijuana possession. These potential outcomes raise the question of whether the negative consequences associated with the prohibition of cannabis are justifiable in terms of a demonstrated deterrent effect of the law? These consequences
therefore need to be weighed against the benefits of this policy, that being the alleged deterrent effect of cannabis legislation. The following section presents an overview of the research that has examined the deterrent effect of cannabis prohibition.

1.7. **The benefits of criminalization: Does deterrence justify the costs?**

"Deterrence is the principal object of punishment. Punishment is meant to persuade others that it does not pay to engage in the prohibited behaviour, and it is also meant to teach a similar lesson to the offender" (Le Dain, 1973; 116).

The goal of the following discussion is to demonstrate the general ineffectiveness of formal social control measures in dissuading individuals from breaking the law. I argue that there is a need to shift our focus away from formal control toward an estimation of the effects of informal social control\(^\text{15}\) on restricting participation in delinquent activities such as cannabis use.

Reliance on the criminal justice system with respect to cannabis prohibition emphasizes the role of formal control\(^\text{16}\) and stems from the belief that the costs incurred by the individual are justifiable given the reduction of use among those punished, as well as those in the general population. Classic deterrence theory states that the likelihood of breaking the law is determined by the severity, certainty and swiftness of punishment (Erickson, 1976). The more severe, certain and swift the punishment the greater the amount of crime that will be prevented. Deterrence theory describes individuals as persons who play an active role in their

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\(^{15}\) Informal social controls are norms that reside in the individual's micro-environment (i.e. family and friends)

\(^{16}\) Formal social control refers to rules created and enforced by the state and associated agencies delineating acceptable and unacceptable behaviours.
behaviours as they possess the ability to choose between alternative courses of action (Thomas and Bishop, 1984).

The evaluation of the deterrent effect of formal social control has a long history (Gibbs, 1968; Sellin, 1969; Tittle, 1969; Paternoster, Saltzman, Waldo and Chiricos, 1982; Jensen, 1969; Teevan, 1976; Waldo and Chiricos, 1972; Zimring and Hawkins, 1973; Grasmick and Appleton, 1977; Grasmick and Green, 1980; Meier and Johnson, 1977). Early research measuring the subjective risk of punishment and self-reported deviant behaviour generally found 'evidence' for the deterrent properties of formal sanctions. However, these studies were based on assumption that the direction of the deterrent relationship was from risk perception to behaviour, and did not consider the possibility that behaviour might influence perceptions of risk (Greenberg, 1981)17.

In general, when researchers began to estimate the 'true' deterrent effect of formal sanctions, the results tended to yield much smaller estimates of deterrent effects than had been previously reported (Paternoster, Saltzman, Waldo and Chiricos, 1983; Paternoster, Saltzman, Waldo and Chiricos, 1985; Saltzman, Paternoster, Waldo and Chiricos, 1982; Minor and Harry, 1982; Paternoster, Saltzman, Waldo and Chiricos, 1982; Weisburd, Waring and Chayet, 1995). These studies suggested that the more accurate interpretation of the results was that an experiential effect, not deterrent effect, was operating. Perceptions of formal legal

17 The notion that prior commission of crime may affect subsequent behaviour is known as the 'experiential effect'. To the extent that this is operating in studies evaluating the deterrent effect of law, observed negative associations between criminal behaviour and perceived risk may be less a reflection of the deterrent effect of sanctions and instead illustrate the effect of prior experience on current behaviour.
sanctions were therefore regarded as having a minimal role in producing conformity\(^8\).

**Deterrent effects of cannabis legislation**

"Virtually the entire spread of marijuana use in Canada occurred after it was prohibited and its use subjected to the harshest penalties" (Alexander, 1990:52).

Studies relevant to the prevention of cannabis use in the general population offer little support for the effects of legal deterrence (Erickson, 1980; Gibbs, 1975; Homel, 1988; Schneider, 1990; Warner et al., 1998). These studies instead reveal low levels of both perceived and actual probability of arrest and also fail to support the hypothesis that the more certain and severe the punishment the greater the deterrent effect. In a recent study of Ontario high-school students these young people felt arrest was unlikely\(^9\) and that "luck" played a greater role in the outcome of their interaction with the police. To this end the police were regarded as being neither proactive nor systematic in the enforcement of the law. Given the number of young people who use marijuana without detection and the perception of lax enforcement, the effectiveness of both police intervention and cannabis prohibition as deterrents are questionable.

There have been few evaluations of the extent to which formal control influences the

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\(^8\) However, findings of an experiential effect do not necessarily negate the role of deterrence, as a failure to be detected and punished for engaging in deviant behaviour may lead to perceptions of minimal risk and subsequent repetition of offenses (a finding in line with the tenets of specific deterrence). However, by raising the possibility of an experiential effect researchers appropriately drew attention to the issue of establishing causality.

\(^9\) Most students indicated getting a warning and having their marijuana confiscated to be the typical outcome; they expected arrest to happen only when there was a suspicion of trafficking.
offender to cease cannabis use after official sanctioning. The only known Canadian study to assess this found minimal support for specific deterrence. While some individuals had discontinued their cannabis consumption a year following their criminal sanctioning, 92 percent of the sample continued to use (Erickson, 1980). In fact in this Toronto study more severe punishment was actually associated with the greatest likelihood of ongoing cannabis use.

Overall, then, these studies reveal low levels of both perceived and actual probability of arrest, and also fail to support the hypothesis that the more certain and severe the punishment, the greater the deterrent effect. The limited empirical support for the deterrent effect of legal sanctions also calls into question the deterrent effects of cannabis legislation and the benefits assumed to be associated with such harsh penalties. Indeed, those adolescents who experience criminal sanctioning associated with their cannabis use may be more likely to encounter disruptions in their life course development.

Regarding cannabis use, the knowledge that at least a small majority of younger people are choosing to abstain from cannabis use, coupled with the absence of what appears to be any substantial impact of formal social control on dissuading cannabis use among young people, leaves us with the question of what is contributing to young people’s choice to abstain from use. Some researchers have suggested that the answer lies in the role of informal social control.

1.8. Informal social control

Given that research generally finds minimal evidence for a deterrent effect of formal
sanctions coupled with the serious personal and social consequences associated with criminalization, I argue that the inhibition of criminal involvement may be better understood in terms of extra-legal factors, including informal social sanctions. Informal social control is more effective in deterring cannabis use among adolescents and therefore an important resource in moderating cannabis consumption among users.

The influence of informal social sanctions on behaviour is tied to principles of social learning theory. According to social learning theory, participation in deviant acts becomes increasingly unlikely when there is little social reinforcement or approval for such behaviour (Akers, 1977; Sutherland and Cressy, 1978). As Paternoster (1989) described, an important consequence individuals consider before making a choice to offend is the likelihood of censure by others.

Most forms of drug intoxication are generally regarded as a pleasurable, fun, enjoyable experience. Therefore understanding this behaviour not only includes issues of what prevents young people from using, but what restrains their level of consumption. This thesis draws on the work of Maloff, Becker, Fornaroff and Rodin (1979) who propose a rationale that offers insight into what prevents people from ingesting the maximum amount of a substance, and how people decide how much of a substance they will take and when.

Social groups are involved in setting limits regarding acceptable amounts of individual consumption. These limits and the perceptions of these limits are informal social controls. It may be that individuals receive conflicting messages regarding appropriate limits of consumption, or that at different points in an individual's life, the norms of certain groups are more salient than those of other groups. However, these norms, regardless of their origin,
may become internalized and accepted as reasonable guides to their own behaviours. To this end, individuals will regulate their consumption of various substances in accordance with these established norms.

There are a variety of informal social control mechanisms that may influence the consumption of various substances. These include including learning how to use, expected sanctions associated with use and the expediency of obtaining the drug (Maloff et al., 1979). However, I argue that to the extent these mechanisms are present in the lives of young people, informal social control can be seen as a general internal resource available to the individual. The pathways through which this resource influences cannabis consumption remain to be clarified, and is one of the goals of this thesis.

1.9. The present study

The present study empirically assesses the relationship between social stressors, informal social control and differential levels of adolescent cannabis use among Ontario students. This research draws on the stress process model and the conceptual framework outlined by Maloff et al. (1979) regarding the role of informal social control in regulating the consumption of marijuana among adolescents. The basic principles of the stress process model are used to describe the relationships between the different stressors, moderators and differential cannabis use.

This thesis addresses two central issues. First, this research examines the relationship between the experience of stress and varying levels of cannabis use. This analysis will not only explore the association between different stressors and cannabis use, but will also
examine the effects of cumulative stress on cannabis use among adolescents. Second, I
examine the relatively untested role of informal social control in the stress - cannabis
relationship. This thesis evaluates informal social control not as a series of individual
mechanisms, but rather as a general resource available to individuals. How this resource
influences cannabis use directly, as well as the extent to which it conditions the negative
effects of stress on cannabis use, will be examined.

1.10. Description of chapters

The role of informal social control and its relationship to varying levels of adolescent
cannabis use is developed over the following eight chapters. This chapter has presented a
discussion of the major issues being examined in this research. It described the historical
development of cannabis use as a criminal offense and the consequences associated with being
labelled a "cannabis criminal". Despite the gradual dilution of cannabis' seriously deviant
status to that of "disreputable", its continued illegality leads to potentially severe
consequences from a life course perspective and that of criminal labelling. This introductory
chapter of the thesis has provided the background and rationale for exploring the complex
relationships involved in understanding differential cannabis use.

Chapter two describes the theoretical framework for the current study, presents an
overview of the existing literature and formulates the central research questions guiding this
study. A conceptual model of informal social control is described based on work by Maloff et
al., (1979) and integrated with the stress process model.

Chapter three provides a description of the data, measures and the statistical
techniques used in this research. The data for this study are taken from the 1997 cycle of the Ontario Student Drug Use Survey. This is a large scale provincial survey of a sample of students in grades seven, nine, eleven and thirteen in the province of Ontario. The final sample consists of 1980 students. Cannabis use was measured using multiple items that include frequency of use, quantity of use and self-reported dependency. Informal social control was also measured using a composite measure that reflects the central concepts discussed by Maloff et al (1979). This chapter concludes with a description of the analytical technique used in this research.

The research results are presented in chapters four, five and six. Chapters four and five present the results of the nested dichotomy analysis that estimates the main and interaction effect models predicting the probability of cannabis use versus abstention (chapter 4) and problem versus moderate use (chapter 5). These chapters begin with a series of preliminary analyses that describe the characteristics of the sample on measures of socio-demographic characteristics, familial and educational stressors and informal social control. In addition, bivariate associations between the variables and the two cannabis outcomes are discussed in each chapter. Finally, the results of the multivariate analyses are presented. These analyses first evaluate the main effects of the stressors and informal social control and address the issue of whether there are distinct predictors of differential levels of cannabis use. Chapters four and five also provide an in-depth analysis of the role of informal social control. In addition to examining the main effects of this variable, these analyses also evaluate whether informal social control moderates the effects of the stressors on the probability of cannabis use outcomes.
Chapter six extends the analysis by examining the role of cumulative stressors on the likelihood of cannabis use among adolescents. In addition to estimating the effects of particular stressors on cannabis use, the relationship between the experience of multiple stressors and differential use is also explored. This chapter uses a nested dichotomies approach to estimate the effects of cumulative stress on the probability of cannabis use, and then provides a within-user comparison estimating these effects on problem level use. Finally, the role of informal social control is also evaluated in this chapter.

Chapter seven provides a discussion regarding the main research findings and their implications. The first portion of the chapter reviews the stress process model that underlies this research. Following this a description of the central research issues as they pertain to the current literature, and how they have added to our knowledge of adolescent cannabis use, is provided. This chapter discusses the results of the analysis regarding whether there are unique predictors of problem cannabis use and the findings that pertain to the relationship between informal social control and differential cannabis use.

Finally, chapter 8 provides the conclusion to this thesis. In this chapter I present a discussion of program and policy suggestions, describe various methodological issues that need to be considered and suggestions for future research.
2.1. Introduction

This thesis furthers the understanding of the processes that influence cannabis use among adolescents. I do this by examining models of differential cannabis use that (1) include an evaluation of the role of family and school stressors; and (2) assess whether the relationship between the stressors and cannabis use is conditioned by the level of informal social control in a person’s life. Further, I investigate the association between cumulative stress and different levels of cannabis use among Ontario high-school students.

This chapter describes the conceptual framework guiding this thesis, reviews existing literature and presents the research objectives. The first section discusses the central aspects of the stress process model and its relevance to my thesis. Briefly, the stress process model offers a useful way to conceptualize a criminalized behaviour, such as cannabis use, within a health-oriented framework and dictates a method of estimating complex interactive relationships among variables. The second portion of this chapter reviews the research pertaining to the association between family and school stressors and adolescent cannabis use. The third section of the chapter discusses the role of informal social control and its relationship with adolescent cannabis use. Finally, this chapter concludes with a description of the research questions and hypotheses that guide the analysis.
2.2. Stress process model

Researchers in the area of mental health have been interested in understanding the processes involved in the translation of the stressors that individuals experience into outcome symptoms of distress or other health problems. A variety of stress process models have been proposed and developed (Billings and Moos, 1992; Cronkite and Moos 1984; Lazarus and Folkman 1984; Pearlin, Lieberman, Menaghan and Mullan, 1981), primarily to examine the nature of stressors and their associations with various health outcomes. As a result, a general stress paradigm has been developed in the study of health and illness.

In comparison to adults and young children, adolescents experience a greater number of stressors in their lives (Compass, Davis and Forsyth, 1985; Hoffman et al., 1992; Newcomb, Huba and Bentler, 1981). Adolescence is also the time when most drug use, including cannabis, peaks. The presence of these two trends during this stage of the life cycle, coupled with the fact that stressful events may act as antecedents to delinquency (Agnew, 1992), suggests that merging these two fields of research (mental health and deviance) may further our understanding of the processes involved in adolescent cannabis use.

Not all youth who are exposed to stressful environmental situations, however, engage in delinquent (and potentially health compromising) activities such as cannabis use. The stress process model allows me to examine this issue because the model incorporates factors that influence the ways in which stressful experiences are translated into outcomes. These factors are regarded as resources that might intervene, acting as moderators, in the stress-outcome relationship. As such, I argue that the stress process model is a useful tool for assessing the complex relationships associated with a criminalized behaviour such as cannabis use.
2.3. Elements of the stress process model

There are three key components to the stress process model: sources of stress, intervening factors and the manifestations of stress. Life experiences do not occur in a vacuum, but are instead influenced by the social structure and the status and roles individuals occupy. A central assumption of this paradigm is that stress is a process encapsulating a variety of factors. These may culminate in a range of outcomes including mental and physical health problems (Pearlin, Monton, Lieberman, Menaghan and Mullan, 1981; Pearlin and Schooler 1978). In general, the stress process model describes the interplay between potentially stressful occurrences, as well as personal and environmental resources, that may influence the effects of stress on health outcomes.

Sources of stress

In the 1950s, Selye (1956) drew attention to the relations between noxious stressors and the patterned physiological reactions of laboratory animals. Selye's theory described a four stage process that included (1) stressors; (2) conditioning factors; (3) a state of stress in the organism called the general adaptation syndrome (GAS) and (4) the response. With the development of the Holmes and Rahe life events checklist (1967), this area of social research expanded to incorporate the study of stress in humans.

This thesis focuses on a set of particular stressors and the influence they have on adolescents. There has been, however, a significant amount of ambiguity surrounding the concept of 'stress'. One aspect of confusion that surrounds the notion of stress lies in the terminology 'stressor', 'stress' and 'distress' (Wheaton, 1996). Social scientists have been
primarily concerned with stressors and the responses (either adaptive or maladaptive) to them and have thus set aside the notion of ‘stress’ (or the General Adaptation Syndrome) as Selye (1956) referred to it. Stressors, then, are defined as “conditions of threat, demands or structural constraints that, by the very fact of their occurrence or existence, call into question the operating integrity of the organism” (Wheaton, 1996:32). A basic principle guiding this model is that stressors and strains have the potential to produce elevated levels of distress. Thus, stressors produce a state of internal arousal resulting from external circumstances that challenge the individual. Stress, however, is not necessarily inherent in these external conditions, but rather results from discrepancies between these experiences, characteristics of the individual (i.e., needs, values, resources) (Aneshensel, 1992) and the amount of change or re-adjustment that is brought about by these events (Holmes and Rahe, 1967).

Stressors are believed to have their origins in the course of social life. Although the stress literature now incorporates a wide variety of stressors including such things as daily hassles, non-events, macro-stressors and sudden trauma, the basic distinction between life events and chronic stress/strain\(^{20}\) remains a central feature of the stress process model. (Brown and Harris, 1978; Dohrenwend and Dohrenwend, 1981; Pearlin et al., 1981; Wheaton, 1990; 1996).

Adolescent stress is found to be associated with several aspects of mental health (Avison and McAlpine, 1992) as well as substance use (Hansell and White, 1991; Huba, Newcomb and Bentler, 1986; Oetting and Beauvais, 1987; Wills, 1986; Wills and Shiffman, \(\ldots\))

\(^{20}\) Life events are relatively discrete experiences while chronic strains represent relatively enduring or persistent conflicts.
1985). However, with few exceptions (see Allison, Adlaf and Mates, 1997 for example) the majority of these studies examine the effects of life events and ignore the role of life strain. Life strains are relatively persistent stressors attached to the performance of social roles (i.e., son/daughter, student) that must be dealt with until they are either overcome or disappear (Allison et al., 1997; Wheaton, 1990).

In addition to stressors, another component of the stress process model is factors that affect how stressors are experienced and the expression of dysfunction. These factors may have interactive effects that moderate the impact of stressors on distress and disorder. An elaboration of this aspect of the model is presented in the following section of this chapter.

**Moderators**

The second element of the stress process model is the moderators. These factors may be either internal (psychological predispositions) or external (social relationships), innate or acquired (Ensil and Lin, 1991). Moderators or buffers are those factors that affect the initial relationship between the stressor and the outcome under investigation, thereby producing an interaction effect. This interaction effect occurs when the joint presence of two exogenous factors affect the outcome (Lin and Ensil, 1989). The presence of these factors serves to reinforce self-identity and/or increase the capacity to either avoid or manage life experiences that may produce stress (Ensil and Lin, 1991). That is, these resources may protect individuals from the negative effects of stressors.
Manzfktion of stress: Cannabis use as a 'negative outcome'

There is a wide spectrum of beliefs surrounding what defines an ‘acceptable’ level of cannabis use for minors. Some argue that no amount of use should be tolerated and a variety of reasons for this stance are given. Some adopt a moral position and argue that it is simply wrong for youth to use any illegal substance even tobacco and alcohol (Dupont, 1996). Others, however, emphasize the potential negative influence substance use has on adolescent development (Clayton 1992; Sampson and Laub, 1993). The latter argument suggests that cannabis use, regardless of the amount and especially for the immature user, may constitute a risk; in addition to compromising physical health, substance use affects development and the acquisition of coping skills. Whether young people consciously initiate cannabis to help them in dealing with stress or realize this potential after they have used, the danger lies in the reliance on drug use as a mean for dealing with their problems.

The notion that the use of one drug leads to the use of other drugs (progression or the "stepping-stone" theory) has also been part of the discussion surrounding the ‘perils’ of cannabis use since the end of World War II (Blackwell, 1988). The initial perception of cannabis use as ‘causing’ the use of stronger substances such as heroin was generally explained on pharmacological grounds. Over time the argument shifted to psychiatric justifications; however, this notion was ultimately discredited. Currently there is little use of the terminology ‘progression’ and instead research typically refers to the notion of cannabis use as a ‘gateway’ drug. The distinction between these concepts of progression and gateway

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21 The perception that the use of one drug “causes” a progression to stronger substances actually emerged during the early part of the century; however it became particularly popular in the US after the second world war (Blackwell, 1988).
is somewhat academic because both terms imply that the use of one drug increases the likelihood of using another. Furthermore, both concepts imply that there are some sort of drug-related forces operating that 'push' users along this continuum (Blackwell, 1988). While cannabis use per se has never been proven to be the cause of more serious drug use, research does reveal that cannabis users are more likely than non-users to use other drugs and poly-drug users are also more likely to have been heavy cannabis users.

In addition to the notion of cannabis operating as a gateway drug, market exposure is another possible outcome associated with use. Specifically, Single and Kandel (1978) argue that cannabis use exposes young people to the general illegal drug market. In turn this may provide a network in which young people are presented with opportunities to try new drugs and are exposed to both sources of other drugs and to other opportunities for crime within the drug market.

The preceding discussion illustrates that cannabis use, at any level, is not necessarily a benign experience. Issues including the quality of the product, the environment or setting in which the individual is using, the interaction of cannabis with other drugs such as alcohol and even the potential adverse physical reaction of first time or inexperienced users are real concerns for any level of use. Understanding the predictors of use at various levels is an important research endeavour. Given that the negative consequences associated with cannabis use are potentially more pronounced for those adolescents using cannabis at problem levels, I am particularly interested in examining those factors that predict this degree of cannabis involvement.

Complex relationships underlie the processes involved in understanding and predicting
adolescent cannabis use. One such process may involve the experience of stressors during this life course stage as discussed above. However, it is also recognized that not all adolescents exposed to stressful environments engage in deviant behaviours. This suggests that there are factors that may promote resiliency in some youth. This possibility has been evaluated within a stress process framework by examining the moderating role of psychosocial resources such as mastery and self-esteem on psychological outcomes. This thesis extends this notion to the evaluation of the role of informal social control. I argue that individuals are exposed to a number of individual informal social control mechanisms that collectively may become internalized into an overall level of informal social control that is part of the individual’s psychosocial make-up. Similar to other psychosocial resources, individuals will possess different levels of this internalized informal social control. Whereas previous research has evaluated the impact of various individual informal social control mechanisms, in this thesis I test whether an overall level of “internal” informal social control acts as a resource for adolescents. In addition to estimating the direct effects, the potential interactive processes between stressors and informal social control as they affect differential adolescent cannabis use are also evaluated.

As shall be elaborated in the following sections, some of the variables that have been identified as being correlated with deviant behaviour have also been labelled as stressors in the field of mental health. Specifically, family and educational variables are generally considered to be strong predictors of both adolescent deviance and negative mental health outcomes. The following sections examine the research findings on the relationship between familial and school sources of stress on adolescent cannabis use and the connections these factors have to
informal social control.

2.4. Sources of stress: Family, school and adolescent cannabis use

The literature examining risk factors for adolescent cannabis use is vast and has spanned numerous scientific domains (Lettieri, 1985; Petraitis, Flay and Miller, 1995; Spooner, 1999). Much research on the etiology of adolescent drug use has concentrated on identifying those factors that promote or encourage this behaviour (Newcomb and Felix-Ortix, 1992; Scheier, Newcomb and Skager, 1994). A wide variety of influences have been identified as correlates of drug use ranging from biogenetic (Bardo and Risner, 1985; Cadoret, 1992; McGue, 1994) to macro environmental-societal factors (Connors and Tarbox, 1985; McCarty, 1985; Spooner, 1999).

There has been some debate within the criminology literature as to the merit of considering the influences of only ontogenetic (i.e., individual differences that are internally driven) or sociogeneic (i.e., individual differences based on social structures and the process of socialization) factors on behaviours. However, the exclusion of one set of factors may preclude identifying potentially important interrelationships between these two processes (Cairnes, 1986; Hagan and McCarthy, 1997). It is not my purpose to ascertain whether one set of processes makes a more significant contribution to explaining adolescent cannabis use than the other. Rather, I recognize the importance of including both types of processes in order to develop a more complete understanding of cannabis use. This thesis incorporates life events and life strains into the model estimating adolescent cannabis use. Although events and strains emerge in many domains, the family and school are the focus of my research and the
first research question evaluated in this thesis is:

*Research Question 1: Do family and school stressors have direct effects on the likelihood of different levels of cannabis use?*

The literature pertaining to family and school stressors is discussed in the following section of this chapter. The hypotheses tested in this thesis are also presented and a summary of the main research question and specific hypotheses is provided in Table 2.1 at the end of this chapter.

*Familial Factors and Cannabis Use: Structure and Relations*

“[The family is] the single most influential childhood factor in buffering the child and shaping later adaptation.” (Merikangas, Cierker and Fenton, 1998: 22)

There has been a considerable amount of research on the influence of familial factors on delinquent and deviant behaviours. Some criminological theories discuss the family as a source of social bonds (Hirschi, 1969). The concept of social bonds and their role in a variety of deviant outcomes is compatible with the stress process model. Hirschi argues that the stronger the elements of social bonding the more likely the individual will tend to conformity. However, if bonds are weak the youth may be more inclined to participate in deviant activities. The stress process model can be used to extend this argument suggesting that weak family bonds have this effect *because* they may constitute a strain in the lives of young people. That is, the nature of the adolescent’s family environment, the degree to which they are attached or bonded to their family, will affect their experience of stress. Multiple factors
associated with the family have been included in studies examining familial influences on adolescent drug use. Two variables that influence familial attachment -- family structure and family relations -- are considered in my analyses.

*Family Structure*

The 'intactness' of families and its effects on adolescent development has received much attention (see Amato and Keith, 1991 for review). In particular, non-intact family structure has been associated with a variety of negative adolescent outcomes including substance use (Flewelling and Bauman, 1990; Foxcroft and Lowe, 1991; Hoffman, 1993).

The family is an important institution providing the socialization of young people. It has generally been suggested that the two-parent family (both parents in the same household) is a better environment for the development of adolescents than single-parent families. Although there has been debate regarding the extent to which this is true, if parents are indeed significant resources for children's development, then all things being equal, the presence of two parents should be better than one (Amato and Keith 1991).

The experience of family disruption\(^\text{22}\) may constitute a stressor in the lives of adolescents as they have to come to terms with issues associated with divorce, death and/or the general loss of a parental role model. Dealing with potential feelings of abandonment and anger toward one or both parents, being shifted from one parent to the other and the

\(^{22}\) I recognize that the single parent family may have arisen from a number of different situations, including divorce and death. These circumstances themselves may be differentially experienced as stressors for adolescents.
additional responsibilities that may be given in the home\textsuperscript{23} place strains on young people with which they must cope.

Research examining children from intact and non-intact families finds that those who experience family disruptions experience more problems than children from intact, two-parent families (Amato and Keith, 1991). Furthermore, remarriage does not always solve the problems that are related to the absence of a parent. Indeed, children living with a step-parent exhibit a significantly greater number of problems than those children living with both biological parents.

One such problem adolescents from disrupted families may experience is a greater likelihood of substance use. A substantial proportion of research examining the association between family composition and delinquent outcomes suggests that parental absence stemming from break-ups, death or divorce places adolescents in a position of increased risk for using and misusing drugs (Blum, 1972; Burnside, Baer, Mc Laughlin and Pokorny, 1986; Flewelling and Bauman, 1990; Foxcroft and Lowe, 1991; Hoffman, 1993; Isohanni, Moilanen and Rantakallio, 1991; Johnston, 1973; Murray, Perry, O’Connell and Schmid, 1987; Tec, 1974; Wells and Rankin, 1991). Thus, previous research on the relationship between family structure and drug use suggests the following hypothesis:

\textit{Hypothesis 1a: Adolescents with a disrupted family structure will be more likely to use cannabis and use at problem levels.}

\textsuperscript{23} Children of broken homes are often placed in the position of being given additional responsibilities to help compensate for the loss of one parent. For example, they may be expected to now devote more time to caring for siblings, cleaning and cooking.
Although there is persuasive empirical and conceptual reason to believe that family structure should be related to problem behaviours in adolescents, not all research has found a relationship between this variable and adolescent drug use (Bailey, Flewelling and Rachal, 1992; Brody and Forehand, 1993; Flewelling, Ennett, Rachal and Thesien, 1993; Piercy, Volk, Trepper, Sprenkle and Lewis, 1991; Selnow, 1987; Sokol-Katz and Ulbrich, 1992; Steinberg, Mounts and Lamborn, 1991). Findings of a significant effect of family structure on cannabis use may be an over-estimation of this relationship in studies that fail to consider the influence of family relations. Indeed, several studies indicate that family structure is of secondary importance to issues of family relations.

Adolescence is a stage of the life course in which young people are striving to form an identity separate from their parents. However, because adolescence is such an important stage in development, positive relationships with one's family where new boundaries and responsibilities are negotiated will make this a potentially more successful transition. Conversely, poor family relationships\textsuperscript{24}, characterized by things such as inter-personal hostility with parents, minimal supervision, and little time spent with family may create an environment in which young people experience insecurity and strain (Maccoby and Martin 1983). One response to this strain may include the participation in delinquent activities such as cannabis use. Adolescents may engage in cannabis use as a means of coping with the strain or to rebel against their parents.

The importance of family relations and the impact of positive parent-child dynamics is

\textsuperscript{24} This parallels the notion of weak family bonding in the criminological literature.
well documented (see review in Denton and Kampfe, 1994; Reardon and Griffing, 1983; Dishion and Loeber, 1985; Jensen and Brownfield, 1982; Kandel, 1984). Family relations encompasses a variety of factors that include family attachment and bonding, affection for parents, parental monitoring and positive familial interactions. These variables are essential to the development of a strong self concept and the prevention of delinquent behaviours including drug use. Research indicates that greater family involvement, better parental supervision and a warm, loving relationship between parent and child decrease the likelihood of drug use. Conversely, poor familial interactions and minimal parental supervision and attention are shown to increase the likelihood of misbehaviour (Boyle et al., 1993; Crundall, 1993; Newcomb and Bentler, 1988; Hawkins, Catalano and Miller, 1992; Rollins and Thomas 1979). These studies suggest that the degree to which adolescents experience poor relationships with their family increases the likelihood of cannabis use and problem cannabis use. Based on this, the following hypothesis is tested in this thesis:

**Hypothesis 1b: The poorer the family relationships, the greater the likelihood adolescents will use cannabis, and use at problem levels.**

Although there is some debate regarding whether family structure or family relations exert a stronger influence on the likelihood of cannabis use, both family variables have been identified as important predictors of adolescent delinquency including drug use. Therefore, family structure and familial relationships are included in my analysis.

**School Stressors and Cannabis Use**

Next to the family, education is one of the most central socializing institutions in the
lives of adolescents. Youth spend a significant portion of their time in the school environment where they are influenced by the personal successes and failures they experience, as well as the nature of the environment itself. Indeed, given the pervasiveness and centrality of the process and context of school during this stage of the life course, these factors are an integral part of an adolescent’s life (Allison et al., 1997). This thesis evaluates these two key aspects of school life (experience and environment) as potential stressors or strains in the lives of young people that may influence participation in deviant behaviour such as cannabis use. The following discussion then, presents a review of the literature surrounding the two school stressors that are evaluated in this thesis and suggests how they might be associated with cannabis use among adolescents.

School Experience

The importance of education for future successes in adulthood has been well documented (Radwanski, 1987; Sampson and Laub, 1993) and is understood and recognized among young people; success in the job market and financial gains require an education. Increasing competition for entrance into universities and requirements for entry level positions may exacerbate these concerns.

However, young people’s sense of self-worth is often fragile; it can be affected by perceived competence and threats to this may constitute a strain for adolescents (Clayton, 1992). Within the school context, there are many opportunities for one’s self-worth and competence to be threatened. This may be particularly salient for those adolescents who experience difficulties with scholastic achievement. Therefore, recognizing the importance of
school and yet not succeeding in that environment may place a significant strain on young people. As this strain persists or intensifies, adolescents may become increasingly demoralized, contributing to a diminished commitment to learning. As such, young people begin to care less about school and may begin to do things that can disrupt the learning process. In such cases, for example, the probability of cannabis use may increase. Another response may be to remove themselves from the stressful situation or environment, that being the school. In this particular case, the choice to do so would result in the loss of supervision that school provides and may, in turn, increase the likelihood of becoming involved in deviant activities including cannabis use.

A variety of factors associated with school attachment have been shown to influence drug use among adolescents. Students who do poorly in school are at a greater risk for cannabis use (Gottfredson and Hirschi, 1990; Hirschi, 1969; Jessor, 1976; Robins, 1980; Smith and Fogg, 1978). Indeed, the frequency and amount of drug use (including cannabis) is predicted by poor academic performance. Commitment to education (i.e. time spent on homework and educational aspirations) is also found to be associated with adolescent drug use (Johnston, O’Malley and Bachman, 1985; Friedman, 1985). That is, drug use is significantly lower among those students who have a strong commitment to education and for those who think they will go to college than it is for those who do not hold these same goals. The review of the literature suggests the following hypothesis:

**Hypothesis 1c:** As school problems increase so to does the likelihood that adolescents will use cannabis and use at problem levels.
School Environment: Perceptions of Drug Use

Various aspects of academic life such as academic failure, absenteeism, distrust of teacher knowledge and low educational aspirations have a significant influence on a range of adolescent outcomes. What has generally not been considered, however, is the impact of school contextual factors such as the school environment. The school environment has become increasingly recognized as an important setting that influences development.

Although research has raised awareness regarding the potential impact of general contextual factors (i.e., the neighbourhood and the family) on risky behaviours including adolescent drug use, a gap in this literature remains with respect to the role of the school environment. That is, the actual school environment may operate as a stressor in the lives of young people and contribute to cannabis use.

I examine one variable that serves as a proxy measure of the school environment that may affect adolescent cannabis use: the student’s perception of the level of drug use in their school. Since this variable reflects the student’s perception, it is not a measure of environment in the same sense as a macro level variable. The following section discusses how the perceived drug use environment of one’s school might increase the probability of cannabis use among adolescents. In this thesis the perception of drug use as a big problem in one’s school is regarded as a potential environmental strain adolescents may experience that has the potential to influence adolescent cannabis use. Attending a school that has a pervasive drug

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25 The 1997 design of the Ontario Student Drug Use Survey was not suitable for school level data analysis. The focus of this wave of the survey was to obtain epidemiological estimates. As such, a wide number of schools were selected, however only one classroom per school was sampled. This would produce weak estimates and small sample sizes for any school-level analysis.
use subculture may create an environment in which the 'temptation' to use, the pressure to use and the exposure to those who could teach you how to use, become overwhelming. This strain may subsequently result in the initiation of drug use or, for those who are users, in the escalation of use patterns. The likelihood of adopting certain behaviours may, to some degree, depend on the extent to which the behaviour is already believed to be widespread (Diez-Roux, 1998).

Variations in school rates of substance use as measured by student’s perceptions have been identified in both small scale and national level studies (Dent, Sussman and Flay, 1993, Ennet and Bauman, 1993; Hill, 1971; Newcomb, Maddahian, Skager and Bentler, 1987; O’Malley et al., 1988; Bachman and Johnston, 1988; Skager and Fisher, 1989). However, this information has typically been directed toward the evaluation of school-based substance use prevention programs (Ennett, Flewelling, Lindrooth and Norton, 1997). What has not been considered in detail is the impact of perceptions of school drug use on individual patterns of use. Drawing on results of studies that have examined the impact of community factors, it may be that those adolescents in school environments where drug use is perceived to be more prominent are at a greater risk for using cannabis and using at elevated levels than are students who do not have these perceptions.

_Hypothesis 1d: Students who perceive drug use to be a problem at their school are more likely to use cannabis and use at problem levels._

**Cumulative stress**

Early stress research emphasized the effects of individual stressors on various
outcomes. However, researchers have suggested that there are several pathways to youth drug use that are not captured by a single etiological factor (Newcomb et al., 1987). Indeed, the number of stressors an individual must cope with will also influence health outcomes. That is, the greater the number of stressors experienced the greater the likelihood of experiencing mental or physical problems. This notion led researchers to suggest that drug use is a general rather than a specific coping mechanism (Bry, McKeon and Pandina, 1982). As Clayton (1992) outlined in series of principles regarding the predictors of drug abuse, "the number of stressors an individual experiences is directly related to the likelihood of drug abuse" (Clayton, 1992: 20). These notions form the basis for another research question proposed in this thesis.

Research question 2: Does the experience of cumulative stress affect the likelihood of different levels of cannabis use?

Therefore, while the experience of a single stressor may increase the probability of drug use, some adolescents are at an even greater risk for drug use and problem drug use because they experience multiple stressors. In addition to seeing drug use as a form of rebellion against institutions such as the family and school that they perhaps see as failing them, adolescents who experience multiple problems in these environments may be more likely to turn to cannabis use as a means of escape or to cope with their stress.

Because adolescence has the potential to be a rather turbulent time for many young people, the experience of multiple stressors during this time is a real possibility. In addition to examining the association between specific stressors and different cannabis use outcomes, this
thesis explores the relationship between the experience of multiple stressors and cannabis use (Chapter 6) and tests the following hypothesis:

**Hypothesis 2a:** Adolescents who report a greater number of stressors are more likely to use cannabis.

**Hypothesis 2b:** Adolescents who report a greater number of stressors are more likely to use cannabis at problem levels.

2.5. Moderators: Informal social control

In addition to describing the role of stressors, the stress process model also recognizes the presence of resources that moderate the effects of stress on outcome. The following section of this chapter introduces the resource that is of particular interest to this thesis: informal social control. The various components of this resource are described and the role of informal social control in the stress process model is discussed.

Research examining the etiology of adolescent cannabis use has tended to concentrate on stressors that promote this behaviour (Newcomb and Felix-Ortiz, 1992; Scheier et al., 1994), while factors that mitigate or protect adolescents from cannabis involvement have been less frequently considered. The nearly exclusive emphasis on factors that increase the likelihood of cannabis use stemmed from the assumption that those who were not exposed to these factors were by default protected from or immune to drug use (Newcomb and Felix-Ortiz, 1992). This, however, paints an overly simplistic picture of the processes associated

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26 Risk factors is the more commonly used terminology in epidemiology and addiction research (examples include: Clayton et al., 1995; Farrell, 1993; Kandel and Davies, 1992; Newcomb, 1992).
with adolescent cannabis use and does not address the more complex relationships between stressors and factors that might attenuate their impact on cannabis use. For example, how do we understand and explain why those individuals exposed to stressors that increase the probability for cannabis use do not engage in drug use?

In this thesis, while evaluating the direct effects of stressors on differential cannabis use, I am specifically interested in estimating the moderating effects of variables on the likelihood of differential cannabis use outcomes. In general, interest in moderating factors stems from the realization that while some individuals experiencing many life stressors may not become distressed, others who experience few stressors can become highly distressed (Thoits, 1982; Turner and Rozell, 1994). Moderating variables are therefore mechanisms or factors that help explain why individuals experiencing similar stressors exhibit either different outcomes or differential levels of the same outcome (Pearlin, 1989).

Research in the areas of developmental psychology and mental health has found that children exposed to similar stressors do not necessarily experience negative consequences (Garmezy, 1985; Garmezy and Masten, 1986; Rutter, 1987). These findings encouraged the hypothesis that there are factors that serve to insulate individuals against the adverse effects of stress, thus reducing the probability of cannabis use.

Within the mental health literature, numerous factors including psychosocial resources and coping techniques have been evaluated for their moderating effects on various psychological outcomes. While these variables have been found to play an important role in the experience of mental health outcomes, there is a paucity of literature pertaining to the influence of resources that influence the consumption of illegal substances such as cannabis.
Social control is an essential element of society and serves many functions (Erickson, 1993). As described in Chapter One, formal controls in the criminal law typically rely on the threat of punishment as a means of deterring cannabis use. Those who advocate the continued reliance on this form of social control may argue that the presence of formal social control serves as a restraining influence for adolescents. However, according to some, law "varies inversely with other social controls" (Black, 1989, p. 74), and is only one way to manage conflict. Regarding cannabis use, research in general has failed to demonstrate a substantial influence of formal control on cannabis use behaviours (Erickson, 1980; Schneider, 1990; Warner et al., 1998). Instead, there are potentially more powerful informal control mechanisms that may operate to restrain drug use or to condition the effects of stressors on the likelihood of cannabis use (Black, 1989). Presence of strong (or high) levels of informal social control will dissuade adolescents from engaging in delinquent activities such as cannabis use and encourage problem solving in the face of stressful situations. This will ameliorate much of the negative effects of stressors and strains.

Research examining a variety of deviant behaviours, including cannabis use, has found perceptions of informal control to be more effective in dissuading individuals from violating laws than perceived severity of punishment or certainty of arrest (Erickson, 1980; Grasmick and Bursik, 1990). Indeed, Paternoster and Iovanni (1986) suggest that social control primarily operates through informal processes. Their research finds that when informal measures of control are included in their model the perceptions of punishment severity and certainty have no impact on delinquent behaviour. These findings of the centrality of informal social control in producing conformity echo those of other research that shows factors such as
social disapproval, peer behaviour and moral beliefs to be more strongly related to criminal involvement than are formal controls. (Bishop 1984a; Meier, Burkett and Hickman, 1984; Tittle, 1980; Nagin and Paternoster, 1991b).

Deterrence research has estimated the effects of informal social sanctions (including parental and peer sanctions, boy/girlfriend and best friend sanctions, occupational and educational sanctions) on different delinquent behaviours using different designs, samples and outcomes. Findings of significant effects of informal social sanctions on participation in criminal acts have been found in cross-sectional and longitudinal, panel design studies using multivariate statistical techniques for high school and college aged individuals (Bishop 1984a; Paternoster 1989; Piliavin, Gartner, Thornton and Matsueda, 1986). Indeed, the general conclusion of these studies is that informal social controls have a more influential role in producing conformity than perceptions pertaining to formal sanctions.

However, informal social sanctions represent only one form of informal social control. There are additional informal factors that extend beyond sanctions that may influence criminal involvement. Some of these are availability (Maloff et al., 1979) and perceived health risks (Johnson, Bachman and O’Malley, 1996). These, in addition to mechanisms that reflect social sanctions are included in this thesis.

Research has rarely evaluated, in detail, the role informal social control plays with respect to adolescent cannabis use. Specifically, the conditioning role of informal social control has not been examined with regard to this type of behaviour in a youthful population. Furthermore, the possibility that individuals internalize these mechanisms and thus possess an overall level of informal social control in their lives remains unexplored.
The level of informal social control that is part of an individual’s life can be generated by different types of informal social controls. For the purpose of this thesis, five such types are considered as the components of an overall level of informal social control. These include social sanctions such as parental disapproval, as well as non-sanction forms of informal social control including personal disapproval, peer drug use, availability and perceived health risks. Briefly, each of the dimensions of informal social control are reviewed and their relationships with cannabis use is discussed.

**Personal Disapproval of Cannabis Use**

Although there is a growing tendency toward a general approval of cannabis use in our society, there are adolescents who continue to disapprove of this behaviour. One of the informal social control mechanisms incorporated in this analysis concerns the student’s level of disapproval towards cannabis use. Personal disapproval may reflect a variety of factors. For example, adolescents who disapprove of cannabis use may have internalized formal social controls and/or social taboos. Conversely, personal disapproval may also reflect the desire to uphold the acceptable limits of consumption that are outlined by one’s social group. Regardless of what may motivate personal disapproval of cannabis use, these beliefs suggest a commitment to the conventional values of our society and convey disapproval of norm violating behaviours (Jessor, Van Den Bos, Vanderryn, Costa and Turbin, 1995). This belief in the wrongfulness of a behaviour may indeed provide a substantial informal social control against the participation in delinquent acts including cannabis use.
Parental Disapproval of Cannabis Use

While personal beliefs likely influence drug using behaviours, attitudes about drugs do not occur in a vacuum; rather they are influenced by other elements in one’s social environment. In their discussion of factors that influence the consumption of various substances, Maloff et al (1979) identify ‘sanctions’ as one of the major informal control mechanisms27. Specifically, guidelines for appropriate and inappropriate substance use are reinforced through positive and negative sanctions. Formal sanctions are typically employed by the state and other officials relying on fines and prison sentences for illicit drug use as sanctioning tools. Informal sanctioning methods, however, tend to rely on approval and disapproval to punish those who diverge from the acceptable limits of substance use (Maloff et al., 1979).

Adolescents are exposed to informal sanctions from many sources; however, of interest in this thesis is the sanctioning role of parents through expressions of disapproval of cannabis use. Drugs are a matter of considerable concern to some parents who may strongly communicate these negative feelings to their children (Johnston, O’Malley and Bachman, 1996). Furthermore, even those parents who have more favourable or tolerant attitudes toward cannabis, in that they did or continue to use it, may wish their own children to avoid or delay early cannabis use (Erickson, 1989). Parents are the ones who first teach their children favourable attitudes towards the substances that are approved by conventional society (e.g., alcohol) and reinforce social taboos (Maloff et al., 1979). Other influences such as the media

27 Until more recently (i.e., Johnston, O’Malley and Bachman, 1996 look at health beliefs) social sanctions have been the focus of studies examining informal social control.
and peers come later. Therefore, knowing that one’s parents do not approve of such behaviours may influence choices made regarding cannabis use.

**Perceived Health Risks Associated with Cannabis Use**

A positive orientation toward health and the view of drugs as incompatible with this orientation may also serve as a form of informal social control. Several studies have explored the association between beliefs and attitudes adolescents hold toward substance use and their use of substances. These studies reveal strong correlations between drug use and the perceptions of harmfulness associated with use regarding a particular substance (Johnston, O’Malley and Bachman 1996; Hamburg et al. 1975; Bachman, Johnston, O’Malley and Humphrey, 1988; Sarvela and McClendon 1988; Skiffington and Brown 1981). In particular, research finds that perceptions of health risks associated with drug use are correlated with the frequency of illicit drug use (Smart, Adlaf and Walsh 1994; Berdiansky 1992; Erickson 1989; Erickson and Weber 1994; Sarvela and McClendon 1988; Waldorf, Reinarman, and Murphy 1991).

**Peer Drug Use**

Another informal control mechanism discussed by Maloff et al. (1979), reflecting the early work of Becker (1953), is what they have termed “learning to use”. Methods of substance use, rules for appropriate use and taboos related to substances are learned through social groups and serve to motivate and/or control such criminal behaviours by either promoting or undermining conformity. People learn to use substances through interactions
with others. While people may learn behaviours through simple observation of those they respect and admire, others (specifically one's peers) may also intentionally teach the individual to use (Maloff et al., 1979).

Interactions with others not only contribute to the modelling of behaviours, but also serve to facilitate the adoption of definitions of behaviours as either “good” or “bad”. These social groups not only reinforce and punish, but also expose individuals to normative definitions and behavioural models. Therefore, while the benefits of drug use are learned from others, similarly taboos are also learned by associating with others who disapprove of the use of certain substances. These interactions, instead of promoting the positive aspects of use, reinforce the potentially negative consequences (Maloff et al., 1979). Logically, the greater the extent to which individuals are encouraged to and actually define behaviours as inappropriate, rather than appropriate, the less likely they are to engage in that behaviour.

Indeed, it is argued that after initial use the actual responses and reactions of those present, as well as the anticipated reactions of others, remain important predictors of use (Akers, Krohn, Lanza-Kaduce and Radosevich, 1979).

An important group influencing the acquisition of certain tastes is the peer group (Maloff et al., 1979). While research suggests that parents introduce young people to substances such as beer and wine at an early age with sips, the peer group influences adolescents to use a wide range of substances including the illicit drugs such as cannabis (Blum, 1969; Hoffman, 1993). Research examining the process involved in learning how to use marijuana emphasizes the role of experienced drug using peers who teach the novice user how to use drugs, what to expect and how to interpret the effects (Becker, 1953; Goode,

Much sociological literature examining adolescent delinquency has centered on the role of the peer group. Various theories have articulated different means by which adolescents are socialized by other youth into delinquent and/or criminal behaviours (Agnew, 1991; Akers et al., 1979; Cloward and Ohlin, 1960; Elliott, Huizinga and Ageton, 1985; Matza, 1964; Sutherland, 1947; Warr and Stafford, 1991). Regarding drug use, prevalence of peer drug use as well as peer pressure have been demonstrated to be predictive of initiation into marijuana and other drug use behaviours (Fergusson, Horwood, Lynskey, 1995; Jenkins, 1996; Jessor and Jessor 1977; Kandel, Kessler, and Margulies 1978; Swadi, 1992; ). Indeed, research has consistently revealed that peer drug use is the strongest predictor of adolescent substance use (Barnes and Welte 1986; Brook, Brook, Gordon, Whiteman and Cohen, 1990; Elliott, Huizinga and Ageton 1985; Kandel 1986; Kandel and Andrews 1987) and this correlation has been consistently documented, whether actual or perceived number of peers using has been examined (Ellickson and Hayes 1991; Elliott et al 1985; Marcos and Bahr 1986; Orcutt 1991; Sorenson and Brownfield 1995; White et al 1991).

However, peer drug use can also be looked at as a mechanism of informal social control. As Kandel (1973;1974) found, more so that any other school, religious or recreational activity, marijuana using patterns (this includes those who choose not to use) are the most important characteristic friends have in common. Therefore, although researchers emphasize the effects of having friends who use marijuana on personal use, Kandel also stresses that those adolescents whose best friends have never tried marijuana are very unlikely to have tried it themselves. This finding has been echoed in the work of Brook and colleagues
(1990) who found that the most powerful predictor of marijuana non-use is an individual’s association with non-drug using peers. Just as the association with other youth who use cannabis may contribute to more favourable attitudes toward the drug and to cannabis use itself, so too may the associations with non-cannabis using peers serve to inhibit cannabis use or restrict the level of cannabis use involvement.

Availability

A final category of informal social control mechanisms discussed by Maloff et al., (1979) is expediency. The term describes how individuals find it convenient to use substances in some ways and inconvenient to diverge from conventional patterns in others. More specifically, convenience may serve to reinforce the learned patterns of use and is “a potent form of social control in its own right” (p.175). A major factor that influences expediency is availability.

The availability hypothesis postulates that the degree to which illicit drugs are accessible to individuals affects the amount and patterns of use (Wagenaar and Perry, 1992). Availability directly affects the opportunity to use drugs and is part of the environment that shapes the normative expectations about appropriate and inappropriate drug consumption.

Although the objective availability of drugs is an important risk factor, subjective availability has also been discussed in the literature. Subjective availability, defined as individual differences in how accessible people believe a drug is to them, outweighs the relationship between objective availability and consumption (Smart, 1980). These findings are echoed by Maddahian, Newcomb and Bentler (1988) who not only find an association
between the actual acquisition of cannabis (peers giving drugs to the respondents in the study) and subsequent drug use, but also find that the adolescent's perceptions of how easy it was to get drugs was also significantly related to the use of a variety of substances.  

**Summary of Informal Social Control Items**

Research that has estimated the effects of different types of informal social controls on different delinquent outcomes, including cannabis use, is important yet restricted. First, these studies have, as previously mentioned, focused on individual mechanisms. Taken collectively, these mechanisms may combine to create an overall level of informal social control in an individual's life that, in turn, provides an important resource promoting conformity in young people. Second, although researchers have examined the relationship between individual items of informal social control and delinquent outcomes, the bulk of these analyses have generally estimated only the direct effects of these mechanisms on drug use. Analyses of this type only provide a partial estimation of the potential contributions informal social control may make to understanding adolescent drug use. These studies fail to consider the potential conditioning processes that may underlie the effect of informal social control on the relationships between predictors and adolescent drug use.

The following section of this chapter describes the more complex role informal social control may play in the stress process model. In doing so I discuss the importance of looking at the direct effects and the rationale for estimating the potential moderating influence of this

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28 It is not known whether these researchers were able to control for the possibility that one's subjective perceptions of availability may in fact be a reflection of the objective availability of cannabis.
2.6. The role of informal social control in the stress process model

The stress process model suggests that there are other variables in addition to stressors that influence the stress outcomes being examined. Within the field of mental health, research has examined not only the direct effects of these resources, but also how they reduce the impact of the exposure to stressors on outcome. Life event research in particular finds that the most consequential effects of these stresses are experienced by those individuals who lack intra-personal resources (Hoffman and Cerbone, 1999). Therefore one research question proposed in this thesis is:

Research Question 3: Does informal social control have a direct effect on the likelihood of different levels of cannabis use?

I extend this argument by examining whether and how the effects of familial and school stressors on different levels of adolescent cannabis use are moderated by informal social control. In other words, in this thesis I evaluate whether informal social control acts as a resource that reduces the likelihood of adolescent cannabis use. In doing so, the direct and conditioning effects of this resource will be estimated.

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29 This literature focuses primarily on mastery and self-esteem as moderators to the effects of life events and strains. This research estimates the ability of these psychosocial resources to affect the outcome under investigation (Thoits, 1995; Wheaton, 1983).
**Informal social control: how it works**

Social control theory suggests that law breaking behaviour occurs when individuals are insufficiently restrained from acting in their own self-interest (Nagan and Paternoster, 1994). One mechanism that operates as a restraint for young people is informal social control. Informal social controls are formed by the individual’s micro-environment (i.e., family and friends) and help the individual define acceptable and unacceptable behaviours. Similar to mastery and self-esteem, individuals may develop an overall level of informal social control that becomes internalized as a part of the individual’s psychosocial make-up and is present in each of us to varying degrees. This “internalized” informal social control is fluid in nature and will be affected by other experiences and environments (Novak and Clayton, in press).

Those with high levels of informal social control may be more likely to also have higher levels of self-regulation / self-control. The concept of self-regulation in the psychological literature refers to emotional, behavioural and cognitive control that occurs in response to environmental demands (Novak and Clayton, in press). It is suggested that those with lower levels of self-regulation are more sensitive to external stimuli like stressors and may be more likely to have a stronger belief in the positive effects (i.e., stress-reduction) of drug use.

High levels of informal social control on the other hand reinforce the desire to conform with the norms or delineations of acceptable behaviour that are established by social groups. Perceptions that others will react negatively toward you or the risk that others will disapprove of non-normative behaviour are heightened for those with high levels of informal social control, with the result that these individuals will not offend or will reduce the frequency of
participation in deviant activities (Thomas and Bishop, 1984). Informal social control may reflect conventionality (or a non-drug conducive resource) so that when faced with stressful situations, adolescents with high levels of informal social control are more likely to adopt problem solving techniques rather than resort to drug use as a means to cope. The following hypothesis is tested in my thesis:

**Hypothesis 3a:** As personal levels of informal social control increase, the likelihood that adolescents will engage in cannabis use decreases.

Choosing to participate in deviant activities however, is not necessarily a single event; rather individuals may make multiple decisions regarding offending behaviour (Paternoster, 1989). All potential offenders\(^3\), make choices about whether to offend or not. For some there will be the choice to offend for the first time ('initial participation decision') and for others there will be the choice to repeat the offense ('continuous decision'). Similar factors may be found that influence the decision initially to use cannabis and the choice to continue to use. That is, different groups of adolescents will define and set 'acceptable' limits of drug use. A recent study of high school students indicates that while "social" or occasional use was equated with the achievement of social success, frequent and "solitary" use was seen in highly negative terms (Warner, Room and Adlaf, 1999). These perceptions suggest the presence of informal social control even among user groups. Therefore, level of informal social control may also influence the level of cannabis use involvement among those currently using this drug. This notion suggests the following hypothesis:

\(^{30}\) This group includes those who have never offended and those who are previous offenders
Hypothesis 3b: Among users, high levels of informal social control will reduce the likelihood of problem cannabis use.

Informal social control: a moderator

As mentioned previously, the direct effects of individual items of informal social control have been the predominant focus in adolescent research whereas the potential moderating (interaction) effects of informal social control on criminalized behaviours, including cannabis use, have been neglected. Adolescents who experience familial and/or educational stressors may be more likely to engage in cannabis use or progress to problematic levels of use. This response may be a reflection of rebellion or an attempt to manage the stress and adversity they are experiencing in these environments. However, not all adolescents who experience these stressors either use cannabis or use at high levels. Understanding what protects youth from the effects of stress is an important research objective. This thesis evaluates the extent to which informal social control acts as a resource in the lives of adolescents, attenuating the effects of these stressors. As such, two research questions are proposed.

Research Question 4: Does informal social control moderate the effects of family and school stressors on different levels of cannabis use?

Research Question 5: Does informal social control moderate the effects of cumulative stressors on different levels of cannabis use?

One possible stress buffering relationship involves an interaction between a source of stress and a coping factor and defines the conditions under which stress does and does not
have an impact (Wheaton, 1985). Regarding informal social control, it is predicted that the effects of family and school stressors on the likelihood of cannabis use and problem use will be attenuated in those groups with high, as opposed to low, levels of this resource. A high level of informal social control (a strong conviction regarding the inappropriateness of cannabis use) may protect adolescents from the negative effects of the stressors that promote or encourage this behaviour. Therefore, informal social control may serve to offset the effects of stress on cannabis use. This leads to six specific hypothesis regarding the moderating effect of informal social control being tested in this thesis:

_Hypothesis 4a: The effects of a disrupted family status on the likelihood of cannabis use and problem cannabis use will be reduced for those adolescents with high levels of informal social control._

_Hypothesis 4b: The effects of poor family relationships on the likelihood of cannabis use and problem cannabis use will be reduced for those adolescents with high levels of informal social control._

_Hypothesis 4c: The effects of going to a school where an adolescent perceives drugs use to be a problem will be reduced for those adolescents with high levels of informal social control._

_Hypothesis 4d: The effects of experiencing problems with school are attenuated for those adolescents with high levels of informal social control._
Hypothesis 5a: The negative effects of reporting cumulative stressors on the likelihood of cannabis use will be significantly attenuated for those adolescents who have high levels of informal social control.

Hypothesis 5b: The negative effects of cumulative stressors on the likelihood of problem cannabis use will be significantly attenuated for those adolescents who have high levels of informal social control.

2.7. Summary and research questions

My thesis explores the effect of family and school stressors and informal social control on differential levels cannabis use. My analysis extends previous research in this area in a number of ways. First, previous research examining adolescent cannabis use has tended to focus on either the general distinction between users and abstainers, or on heavy users only. Little empirical attention has been given to distinguishing among factors that contribute to differential levels of cannabis use among adolescents, particularly the group at most risk of health and legal consequences. In previous research that restricts the analysis to an abstainer-user comparison, potentially important differences with respect to the predictors of problem use are missed. By estimating the effects of these stressors on different levels of cannabis use outcomes (abstainers versus users; moderate versus problem level use) I can evaluate whether the experience of stress has the same effect when we compare abstainers and users as it is does within the group of adolescent cannabis users. These findings may have important implications for intervention initiatives. Further, I extend the analysis of the relationship between stress and cannabis use by examining the effects of cumulative stress among
adolescents on the likelihood of different levels of cannabis use. Again, these findings may
have important consequences for understanding the role and effect of stress in the lives of
adolescents.

Second, I have proposed a stress process model that links together family and school
stressors and informal social control with cannabis use among adolescents. This model is
consistent with a well established tradition in drug research that examines factors that serve to
either increase or decrease the likelihood of drug use. However, by incorporating the role of
moderators, the stress process model also advances our understanding of the complexities
associated with cannabis use. Therefore, another important contribution of this thesis is my
examination of the role of informal social control in understanding different levels of cannabis
use among adolescents.

The role of informal social control has been relatively neglected in the study of
adolescent cannabis use in spite of early research that suggests its importance (Erickson,
1980; Maloff et al., 1979). Further, although some research suggests a direct effect of
informal social control on reducing the likelihood of cannabis use, the more complex
moderating influence informal social control may have on reducing the likelihood of cannabis
use among those exposed to stressors that promote use remains untested. Therefore, while
adding to the limited research that has discussed the direct effects of informal social control,
this research will also examine whether informal social control “protects” at risk (i.e.,
stressed) adolescents from becoming involved with cannabis use, and in particular, from using
at problem levels.

Finally, as outlined in this review, a series of individual types of informal social control
have typically been evaluated for their effects on deviant behaviours. My thesis extends the understanding of informal social control by developing an overall measure of this resource that is based on the presence of different types of informal social control mechanisms in the lives of adolescents. In doing so, this allows me to evaluate informal social control as a general psychosocial resource.

My thesis, drawing on the stress process model, then, presents an analysis of the relationships between family and school stressors and differential cannabis use as well as the direct and moderating effects of informal social control on the probability of differential levels of cannabis use among high school students in Ontario. The main research questions as well as the general and specific hypotheses are reviewed in Table 2.1. In the following chapter I outline the data and describe the measures and analytical techniques that will be used to address these questions.
<table>
<thead>
<tr>
<th>Research Question 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do family and school stressors have direct effects on the likelihood of different levels of cannabis use?</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>General Hypothesis</strong></th>
<th><strong>Specific Hypotheses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adolescents who experience family and/or school stressors will be more likely to use cannabis and use at problem levels.</td>
<td>1a. Adolescents with a disrupted family structure will be more likely to use cannabis, and use at problem levels.</td>
</tr>
<tr>
<td></td>
<td>1b. The poorer the family relationships the greater the likelihood adolescents will use cannabis, and use at problem levels.</td>
</tr>
<tr>
<td></td>
<td>1c. As school problems increase so to does the likelihood that adolescents will use cannabis, and use at problem levels.</td>
</tr>
<tr>
<td></td>
<td>1d. Students who perceive drug use to be a problem at their school are more likely to use cannabis and use at problem levels.</td>
</tr>
</tbody>
</table>
### Research Question 2

**Does the experience of cumulative stressors affect the likelihood of different levels of cannabis use?**

<table>
<thead>
<tr>
<th>General Hypothesis</th>
<th>Specific Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. As the number of stressors experienced increases for adolescents, the likelihood of cannabis use and problem cannabis use will increase.</td>
<td>2a. Adolescents who report a greater number of stressors are more likely to use cannabis.</td>
</tr>
<tr>
<td></td>
<td>2b. Students who report a greater number of stressors are more likely to use cannabis at problem levels.</td>
</tr>
</tbody>
</table>

### Research Question 3

**Does informal social control have a direct effect on the likelihood of different levels of cannabis use?**

<table>
<thead>
<tr>
<th>General Hypothesis</th>
<th>Specific Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Higher levels of informal social control will reduce the likelihood of cannabis use and problem cannabis use among adolescents.</td>
<td>3a. As personal levels of informal social control increase, the likelihood that adolescents will engage in cannabis use decreases.</td>
</tr>
<tr>
<td></td>
<td>3b. Among users, high levels of informal social control will reduce the likelihood of problem cannabis use.</td>
</tr>
</tbody>
</table>
**Research Question 4**

Does informal social control moderate the effects of family and school stressors on different levels of cannabis use?

<table>
<thead>
<tr>
<th>General Hypothesis</th>
<th>Specific Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. The effects of familial and school stressors will be significantly attenuated for those adolescents with high levels of informal social control.</td>
<td>4a. The effects of a disrupted family status on the likelihood of cannabis use and problem cannabis use will be reduced for those adolescents with high levels of informal social control.</td>
</tr>
<tr>
<td></td>
<td>4b. The effects of poor familial relationships on the probability of cannabis use and problem cannabis use will be attenuated for those adolescents with high levels of informal social control.</td>
</tr>
<tr>
<td></td>
<td>4c. The effects of going to a school where an adolescent perceives drug use to be a problem will be reduced for those students with high levels of informal social control.</td>
</tr>
<tr>
<td></td>
<td>4d. The effects of experiencing problems with school are attenuated for those adolescents who have higher levels of informal social control.</td>
</tr>
</tbody>
</table>
### Research Question 5

Does informal social control moderate the effects of cumulative stress on the probability of different levels of cannabis use?

<table>
<thead>
<tr>
<th>General Hypothesis</th>
<th>Specific Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. The effects of experiencing cumulative stressors on the likelihood of different levels of cannabis use are significantly attenuated for those adolescents with high levels of informal social control.</td>
<td>5a. The negative effects of reporting cumulative stressors on the likelihood of cannabis use will be significantly attenuated for those adolescents who have high levels of informal social control.</td>
</tr>
<tr>
<td></td>
<td>5b. The negative effects of cumulative stressors on the likelihood of problem cannabis use will be reduced for those with high levels of informal social control.</td>
</tr>
</tbody>
</table>
3.1. Introduction

My research examines the effects of family and school stressors and the role of informal social control on different levels of cannabis use among adolescents. This chapter describes the data, measures and analytical methods used in this thesis. The data used for these analyses come from the 1997 cycle of the Ontario Student Drug Use Survey. I begin this chapter by describing these data, and the design and sampling procedures of the survey in the first section of this chapter. Next I describe the operationalization of the variables used in this research. Finally, I outline the statistical techniques that are used in this thesis.

3.2. Data

The following analyses are based on data derived from the 1997 cycle of the Centre for Addiction and Mental Health's Ontario Student Drug Use Survey (OSDUS), a cross-sectionally repeated survey administered every two years to students in grades 7, 9, 11 and 13 throughout Ontario by the Institute for Social Research (ISR) at York University. The survey is based on a stratified, single-stage cluster probability design. The sample of students is randomly selected from 16 strata (4 regions x 4 grades) and classrooms were used as the sampling unit. The OSDUS '97 comprises students from 22 school boards, 168 schools and

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31 Complete detailed discussion of sample design procedures is presented in Adlaf, Ivis and Smart (1997).
234 classes.

Eligible students are those enrolled in regular public or Catholic schools. This excludes special education classes, private schools, students institutionalized for medical or correctional reasons, as well as those on Indian reserves, in Canadian Forces bases, or in the extreme Northern regions of Ontario.

Agreement to participate in the survey was conditional upon permission being granted by school board research review committees, principals, classroom teachers, and parents. If a school board did not participate, a replacement board was randomly selected from the same stratum. However, if an individual class or a student refused to participate, no substitution took place and the data were then weighted to correct for any loss of precision. All schools were provided with parental consent forms, however, it was up to the individual boards to decide whether these forms were required\(^\text{32}\). Any student without a signed consent form (8.7%) was excluded from participating in the survey. The self-administered questionnaires were given to the students in class groups and on average took 33 minutes to complete. Participation was anonymous and voluntary. The student participation rate was 76.7% (14.7% lost to absenteeism and 8.7% lost to failure to provide parental consent form), resulting in a total sample size of 3,990 students (21 were also excluded for responding affirmatively to using a fictitious drug).

In order to cover as many issues surrounding adolescent drug use in the allotted period of time, two questionnaires, are used. Half of the students in each class room were randomly selected to fill in either questionnaire. There are approximately 168 items included in

\(^{32}\) All of the school boards required parental consent.
questionnaire A, 187 are in questionnaire B and roughly 110 items are common to both. For the purpose of my research, the sample consists of those students who completed questionnaire B (N=1,980). This questionnaire was selected as it contained items not included in questionnaire A that are particularly relevant for addressing the substantive issues of this research\textsuperscript{33}. Specifically, questionnaire B contains questions pertaining to school factors such as academic success, homework, and educational attachment that are believed to be important risk factors for adolescent drug use. In addition, this questionnaire contains an expanded list of questions regarding parental/familial attachment bonding and parental monitoring as well as a series of items describing school drug use that are important factors to these analyses.

\textit{Benefits of the Ontario Student Drug Use Survey}

The Ontario Student Drug Use Survey (OSDUS) provides data on several indicators of substance use and other related issues. The survey includes questions regarding demographic and social characteristics of the students, frequency of substance use in the prior year, quantity of cannabis use per occasion, extent of problem illicit drug use, reasons for using cannabis, availability of drugs, attitudes and beliefs towards substance use and self-reported dependency. As such, these data are well suited to my research questions.

In addition, the survey is based on a random probability sampling design and generates representative samples. Also, because at least 20 school boards and approximately 200 schools participate, and because the survey is widely dispersed through the province of

\textsuperscript{33} The items from the Ontario Student Drug Use Survey that were selected for the analyses in this thesis are presented in Appendix A.
Ontario, the survey has the potential to capture diverse drug using behaviours and patterns. The method of administering the survey also enhances the probability of participation. Classroom administration tends to increase the participation rate, decrease cost and reduces the risks for under reporting because it is anonymous (Akers et al., 1983; Campanelli, Dielman and Shope, 1987; Wagenaar, Komro, McGovern, Williams and White, 1993). Typically, school surveys obtain higher response rates regarding drug use than household surveys (Adlaf, Paglia and Ivis, 1999). Further, self-report student surveys allow researchers to study large samples, have more accurate sampling frames than studies using street youth for example, and are less prone to some of the biases evident in official record keeping (Hagan and McCarthy, 1997). Finally, the OSDUS data are based on individual responses. To this end, it is possible to estimate the predictors and correlates of not only drug use in general, but also factors associated with differential levels of drug use (i.e., high risk groups).

There are limitations of the Ontario Student Drug Use Survey and the implications of these will be discussed in greater depth in Chapter 8. Perhaps the most notable limitation, however, is the cross-sectional design of the study. Cross-sectional data prohibit drawing conclusions regarding the causal direction of the observed relationships. Throughout my thesis, although never stated explicitly, direction of causality is assumed. However, a cross-sectional design does not provide the empirical support to make such a claim. Thus, while it is expected that changes in the independent variables will 'cause' a change in the dependent variable, one must exercise caution when making such assumptions. This is the

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34 Hagan and McCarthy (1997: 5-6), while acknowledging the advancements self-report methodologies have made to criminology, also discuss the concerns associated with restricting this methodology to junior and senior high-school students.
central weakness of studies that examine groups of individuals at only one point in time.

Although this limitation needs to be recognized, there is at least some longitudinal research (see Newcomb et al., 1987 for example) that supports the use of the stressors I am incorporating in this thesis as being causally prior to the outcome variable, cannabis use.

3.3. Measurement$^{35}$

Dependent Variable: Cannabis Use

The dependent variable ‘cannabis use’ was created from three measures: frequency of use, quantity consumed and self-identified problems with cannabis use. Frequency of use was measured by asking the students “how often have you used cannabis (also known as marijuana, grass, pot, hashish, hash, hash oil) in the past 12 months.” Students responded on a nine-category ordinal scale with the following response options: do not know what cannabis is, have never used cannabis in my life time, have used cannabis but not in the last 12 months, used 1-2 times in the last 12 months, used 3-5 times in the last 12 months, used 6-9 times in the last 12 months, used 10-19 times in the last 12 months, used 20-39 times in the last 12 months, used 40 or more times in the last 12 months.

The measure of quantity of cannabis use was restricted to a use in the last four week period in order to increase the chances of accurate recall. Furthermore, students were cautioned that if they had shared joints with others they were to count only the amount they had smoked themselves. Specifically, students were asked “during the last four weeks, on occasions when you have used marijuana, how many joints did you typically smoke”.

$^{35}$ This information is also summarized in Appendix B
Responses included; did not smoke in the last four weeks, less than 1 joint, about 1 joint, 2 to 3 joints and 4 or more joints.

Finally, three questions pertaining to self-identified problems with cannabis use were used to create a proxy measure of cannabis dependence\textsuperscript{36}. Students were asked to indicate: (1) whether they had tried to stop using cannabis but found they could not stop; (2) whether thinking back over their whole life, there was a period when they used cannabis every day or almost every day for at least a month; and, (3) if in the last 12 months they had tried to cut down their use of cannabis. A final measure of ‘problems with cannabis’, was created by summing the three binary items, that ranged from 0 to 3 with 0 indicating no problem indicators and 3 representing those who reported all three problem indicators.

A three-category measure of cannabis use was created from the three variables, frequency, quantity and a proxy measure for dependence. As a dependent variable, cannabis use has been most frequently evaluated as a dichotomous measure: use versus no-use. However, cannabis use may be better represented as a polytomous measure with different levels. That is, blending these individuals into one ‘user’ category may obscure potentially important information regarding predictors of differential levels of cannabis use.

As discussed in Chapter 1, the role of informal social control in influencing cannabis use is largely unexamined. As such, the general comparison between abstainers and users will provide new information regarding the effects of informal social control. Therefore, retaining the ‘no-use’ or abstainer category is important for my thesis as I am interested in estimating

\textsuperscript{36} These items are based on the criteria outlined in the DSM-IV for diagnosis of drug dependence, however it is not the authors intention to claim to have measured dependence in these analyses.
models that evaluate informal social control as it predicts cannabis use versus abstention.

Regarding the 'user' category as articulated in the previous chapters, I am particularly interested in adolescents who are using cannabis at problem levels. Therefore, it was necessary to construct a category to reflect this dimension of use. Furthermore, because I am primarily interested in predicting the likelihood of problem cannabis use, all other users were combined in the moderate user group.

The operationalization of cannabis use has generally been based on frequency of use. Although different terminology (i.e., heavy use, frequent use and daily use) and classification of 'problem' use has been used, the criteria of using 20 or more times in the past 12 months has generally been followed (Brook, Cohen, Whiteman and Gordon, 1992; Ellickson, Bui, Bell and McGuigan, 1998; Kandel and Davies, 1992; National Household Survey on Drug Abuse, 1991). There is no pre-established criterion for problem and/or moderate use that takes into consideration all three indicators. For the purpose of my thesis however, in addition to adopting this frequency criterion, measures of quantity and a proxy for dependence are also incorporated into defining differential levels of cannabis use. Table 1 illustrates the criteria used to classify students into either the abstainer, moderate cannabis user or problem cannabis user group and the rationale behind this operationalization follows.

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37 Brook et al. (1992) classify problem users as those who use cannabis one time a week or more; this translates into 20+ times a year.
Table 3.1. Operationalization of the Dependent Variable Cannabis Use.

<table>
<thead>
<tr>
<th>Abstainers</th>
<th>Moderate Users</th>
<th>Problem Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ students indicating either never using marijuana in their lifetime or not knowing what marijuana is</td>
<td>~ students using less than 20 times in the past year AND ~ who smoked one joint or less when smoked in the past 4 weeks AND ~ who indicate 0 to 1 dependency indicator</td>
<td>~ students reporting 2 or more dependency indicators AND ~ who report frequency of using 20+ times in the past year OR ~ who report smoked 2 or more joints when smoked in past 4 weeks</td>
</tr>
</tbody>
</table>

One practical consideration I take into account when developing criteria for the problem use category is the issue of statistical power. Given the explicit interest in predicting problem cannabis use, it was necessary to construct a measure that was an adequate representation of problem cannabis use, but also produced an adequate number of students in the category for analysis.

The first step in the process of creating the dependent variable was to set the criteria for the abstainer group. The strictest definition of 'non-user' was set as the criterion to classify adolescents into the abstainer group. Based on the frequency component, those who indicated never using cannabis in their lifetime were labelled abstainers. Indicators of quantity of use and dependence issues are not applicable to this group and were, therefore, not included in the operationalization.

The second stage was to define the criteria for problem cannabis use as the other users
would, by default, fall into the moderate use category. Problem cannabis use was operationalized as students who report two or three dependency items AND either report a frequency of using more than 20 times in the past 12 months OR when they have smoked in the past four weeks, used two or more joints. Problem cannabis use was operationalized in this manner for two reasons. A classification of problem cannabis use could have been restricted to meeting the highest criterion on all three indicators (high frequency, high quantity and all three dependency items). However, this would not produce an adequate number of students in the problem use category. Second, the defining characteristic of problem cannabis in this research was perceived to be self-reporting of dependency indicators. Therefore, if the student indicated experiencing two or three problems with cannabis use, the less restrictive criteria of either high frequency of use or high quantity of consumption was deemed acceptable.

No prior literature has evaluated this type of operationalization of cannabis use. As a result, careful attention has been given to the issue of the validity, particularly the problem user category, of this measure of cannabis use. Based on the three criteria of use, I constructed a typology of the dependent variable and have evaluated its merit. To do this several additional analyses were conducted. First I tested the construct validity of this measure. In addition to those variables I have selected for my analyses, the dependent variable, cannabis use, should also be associated (either positively or negatively) with other variables in the data set. If these relationships are in the expected direction, this lends support to the construct validity of my measure. Therefore, the association between my measure of cannabis use and four other variables (grades, self-esteem, number of best friends who use
drugs and delinquency) was tested. I hypothesized that there would be an inverse relationship between cannabis use and grades and self-esteem and a positive relationship between delinquency and number of best friends using drugs. No rigorous means of validating this measure (e.g. positive urine test for THC) were available. Therefore, in the absolute sense I am unable to validate this measure, however using crude methods at a minimum I do expect to see significant correlations.

To test these hypotheses I conducted a series of ANOVAs that estimated whether there was a significant difference in the mean distribution of the independent variables across the categories of the dependent variable. If problem users had significantly lower mean scores on the measures of grades and self-esteem and higher scores on delinquency participation and number of best friends who use drugs, the hypotheses were confirmed. All of the relationships were found to be in the expected direction: problem cannabis users had significantly lower grades ($p< .000$) and lower levels of self-esteem ($p = .003$), higher scores on the delinquency measure ($p< .000$) and a greater number of best friends who used drugs ($p< .000$) than the other users and abstainers.

In addition to evaluating the construct validity I also conducted a series of analyses estimating the main effect and interaction effect models using various categorizations of the dependent variable (with particular emphasis on the moderate and problem cannabis use categories). The results of these analyses do not produce significant changes in the findings. Therefore, the models are not sensitive to small changes in the measurement of the dependent variable. This, coupled with the estimates of construct validity gives me some confidence in using this variable as a measure of cannabis use. However, I recognize that these are crude
indicators and this particular operationalization of cannabis use remains to be evaluated in other studies and subjected to more strenuous tests of validity.

**Measures of the Control Variables**

*Age and Gender*

Age was treated as a continuous measure ranging from 11 to 20+ years of age. The average age of the students was 15.38 (SD= 2.25). Gender was coded into a dummy variable where males = 1 and females = 0. There were slightly more females (52.4%) than males (47.6%) in the sample.

*Socio-economic Status*

Information about household income was unavailable and, therefore, socio-economic status was assessed using a subjective measure that asked students to rate their family financial situation as well above average, somewhat above average, about average, somewhat below average or well below average (coded 1 through 5). This measure has been used previously in studies with adult populations (Dubnoff 1985) and has some empirical validity (Gore, Aseltine and Colton 1992). This variable averaged 2.54 with a standard deviation of .89.

**Measures of Sources of Stress**

The following section of the chapter describes the measures of stress and the procedures used to construct these variables. The original items and their subsequent recoding are presented in Appendix B.
Family Relations

Family relations was created using a composite measure constructed from five variables pertaining to different aspects of parental interactions. Each of the five items were coded (or recoded where necessary) so that a high score represented poor family functioning. The variable *family time* asked students to indicate the amount of time they spent with their family on the average weekend using a 4 point scale ranging from 'a great deal of time' to 'very little time'. *Relational quality* was measured by having the students indicate whether they got along very well, okay, or not well with their parents. The measures of maternal and paternal involvement and parental monitoring were assessed on a 5-point ordinal scale ranging from always to never. Parental *involvement* was evaluated by asking how frequently students discussed problems with their mother or father. Finally, parental *monitoring* was assessed by asking the students if, in their free time, their mother or father knows where they are.

A principal component factor analysis of the five variables revealed a single factor with an eigenvalue (2.44) greater than one and 48.8 percent of the common variance was accounted for by this factor. The individual factor loadings were: mtalk (.78), dtalk (.71), along (.68), time (.67) and super (.65). It appears then that all five items measure the construct family relations. Following this, an overall measure of family relationships was created by summing the scores on each of the five variables. The new variable (POORREL)

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38 Only a small percentage of students indicated their mother (N=17) and/or father were deceased (N=78). To prevent any potential confounding of the relationship between family variables and the outcome measure, these cases were excluded from the analysis (Adlaf and Ivis, 1996).
has a range of 0 to 17 where 0 represents very good family relations and 17 is indicative of very poor family relationships. The average score on this variable is 6.33 with a standard deviation of 3.48 and the alpha reliability of this measure is .72

*Family Structure*

Students were asked to identify whether they were currently living with both natural parents, natural father only, natural mother only, one natural parent and one stepparent or neither natural parent. Research has demonstrated significant associations between the experience of ‘parental problems’ (i.e., parental, separation, divorce, death) and substance use (Brown, 1989; Budd, Eiser, Morgan et al., 1985; Duncan, 1977). To evaluate this association among Ontario students, this variable was recoded into a new dummy variable reflecting the experience of any familial disruption (FAMDIS)\(^{39}\). Specifically, those students who were currently living with both natural parents were given a score of 0 while those who had experienced any form of familial disruption were given the score of 1. The mean score on this variable was .26 with a standard deviation of .44. So, 26 percent of the students were in families that were not traditionally intact.

*School Stress*

A composite measure of problems with school was created from five questions that capture concepts including marks, behaviour, expectations and attachment to school. Each of

\(^{39}\) This is not to say that there are not situations in which a natural two parent family structure acts as a stressor for adolescents or that all ‘disrupted families’ are inherently stressful.
the five variables was coded so that higher scores would reflect greater problems with school. The first item included in this measure was marks. The students were asked to indicate the marks they usually got in school using a five-point ordinal scale ranging from A (80 - 100%), B (67 -79%), C (60-66%), D (50-59) and below 50%. In addition to reporting their marks, students were asked to rate their school work in comparison to others using a scale that ranged from far below average to far above average. This measure was reverse coded so that ‘far below average’ perceptions were given the high score of 6.

A behavioural measure -- time spent on homework outside of school-- was also incorporated in the school stress measure. A categorical variable measured the number of hours students spent on their homework. The six-category scale ranged from doing no homework to doing seven or more hours of homework per week outside school time. This variable was reverse coded in the direction of greater risk so that those students who indicated doing no homework outside of school were given the high score of 5, and those who reported at least seven hours of homework per week were given the low score of 0.

A measure of attachment to education was also included based on a four-point scale, (1= not at all likely; 2= not very likely; 3= fairly likely; 4= very likely) gauging the students perception regarding the likelihood of remaining in school until graduation. This item was recoded so that the new variable ranged from 0 to 3. Those who indicated it was not very

There are limitations to this measure of school stress. Other factors associated with the process of schooling such as interactions with teachers for example, are not included in this measure. Further while I argue that stress is associated with experiencing problems with school, it is also possible that stress may be associated with being a higher achiever (i.e. the pressure to get and maintain higher grades or being pressured in putting in longer homework hours).
likely they would remain in school were given the high score of 3.

Attitude toward education was measured by a single item that asked students to indicate how they felt about going to school. This concept was captured by presenting the students with a five-point scale gauging the degree to which students ‘liked’ school (1 = like school very much; 2 = like school quite a lot; 3 = like school to some degree; 4 = not like school very much; 5 = not like school at all). For consistency with the other measures this variable was reverse coded with a new range from 0 to 4.

A factor analysis of the five items indicated that each of the items loaded on a single factor with an eigenvalue of 2.29 and were, therefore, measuring the same construct. The percentage of the common variable accounted for by this factor was 45.7 and the individual factor loadings were: marks (.83), rate (.81), hwork (.62), grad (.54) and likesch (.53). An overall measure of problems with school was created by summing the scores on each of the five variables. The new variable (EDUPROB) has a range from 0 to 21 where 0 represents no problems with school and 21 is indicative of many problems. The average score of this variable is 6.92 with a standard deviation of 3.26 and the alpha reliability of this measure is .67.

School Level Drug Use Risk Factor

Sociogeneic as well as ontogenetic factors play an important role in the processes associated with delinquency. The various social environments in which young people are embedded influence their behaviours. There are many aspects of the school environment that may influence adolescent deviant behaviour. For the purpose of this thesis however,
perceptions of drug use in the adolescent’s school is evaluated. Again, as mentioned previously, this is not a measure of the school environment in a macro-level variable sense. Rather, because I was not able to construct an efficient measure of school-level drug use, perceptions of school drug use reflect a proxy measure of this variable.

Perceived school level drug use was measured by a single item that asked students about the extent to which they thought drug use was a problem in their school. The students were asked if they thought drug use in their school was a big problem, a small problem or no problem at all. Just over half of the students (52%) felt drugs were a small problem in their school, roughly a quarter (26.9%) felt they were a big problem and 21% indicated drug use was not a problem in their school. This variable is being used in this thesis to reflect the potential exposure to cannabis in one’s school. It is reasonable to suggest that students who report drug use to be a problem in their school are more likely to be exposed to cannabis, to perhaps have been repeatedly offered the drug, to know who the sellers and users are and therefore to be more likely to use cannabis.

This variable is used to estimate the relationships between perceptions of drug use in one’s school as being a ‘problem’ and differential cannabis use. As such, the decision was made to create a binary variable that captured those students who felt drugs were not a problem in their school and those who perceived drug use to be a problem (whether that be a small or big problem). The original variable was recoded into a dichotomous measure (SCHDRUG) where 0 indicated ‘no problem’ and 1 represented ‘any level of problem’.

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41 I recognize that this is not a perfect measure of this variable. However, I am constrained by the existing measures on the Ontario Student Drug Use Survey and feel this variable is justified as a proxy measure.
Those students who felt drug use was not a problem in their school were given a score of 0 and those who indicated drug use was any sort of a problem were coded 1. The mean score on this variable was .79 with the standard deviations of .41

**Informal Social Control Mechanisms**

One aspect of this thesis evaluates whether a valid composite measure of informal social control can be constructed from five separate items that have been used previously as informal social control indicators. In developing an overall indicator of the level of informal social control that a person has in their life (based on the items selected in this thesis) it is then possible to estimate whether informal social control acts as a resource (like mastery and self-esteem) young people can draw on when faced with stressful experiences. If this analysis suggests that it is possible to create such a measure the effects of informal social control on differential cannabis use will be estimated.

A single measure of informal social control was developed using five variables that are identified by Maloff et al. (1979) as single indicators of informal social control. These variables include perceived health risks associated with cannabis use, personal disapproval toward cannabis use, perceived parental disapproval toward cannabis use, availability of cannabis and peer drug use (see Figure 1).
The following section details the measurement of these individual variables and then describes the procedure used to construct the overall measure of informal social control.

**Perceived Health Risks**

Three items were used to create a measure of perceived health risks associated with cannabis use. Students were asked two questions about how much they thought people risked harming themselves (physically or in other ways) if they (a) try cannabis once or twice and (b) smoke marijuana regularly. Students were asked to rate the risk using the following response options: 1 = no risk; 2 = slight risk; 3 = medium risk; 4 = great risk; 5 = don’t know. These variables were recoded so that perceptions of ‘no risk’ were given the value of 0, slight risk = 1, medium risk = 3, great risk = 4 and don’t know = 2.

Separate analyses were conducted on the ‘don’t know’ category in order to determine the best use of this response. Of the total number of students who responded “don’t know” on each variable (N=164 and N=143), over 90% were abstainers. Retaining this information had substantive value as it is possible that uncertainty regarding potential physical or other
outcomes of cannabis use influences the decision to use this drug. Indeed, not knowing the health effects of cannabis use may possibly reduce the likelihood of use. Therefore, ‘don’t know’ was preserved as a separate response category and was given a value of 2 (the midpoint between slight and medium perceived risk\textsuperscript{42}. In addition, students were asked a question relating specifically to the likelihood of developing health problems as a result of cannabis use (If you use cannabis in the next 12 months, how likely is it that you would develop health problems? 1 = very unlikely 2 = unlikely; 3 = likely; 4 = very likely). In order to maintain consistency with the other perceived negative health consequences variables, this item was recoded to range from 0 (very unlikely) to 3 (very likely).

Based on these three items (harm if try cannabis once or twice; harm if smoke marijuana regularly; likelihood of developing health problems) a composite variable HLTHRSK was constructed by summation. This new measure reflected the increasing degree of perceived negative health consequences associated with cannabis use and ranged from 0 to 11 with a mean of 6.24, a standard deviation of 2.96 and an alpha reliability of .68.

**Personal Disapproval**

Two items pertaining to attitude toward cannabis use were used to create a composite

\textsuperscript{42} These three items were used to create an overall measure of perceived health risk and therefore separate reliability analyses of this measure were conducted when ‘don’t know’ was recoded to missing and to a score of 1. The reliability was virtually unchanged (alpha=.67) when ‘don’t know’ was recoded to 1. There was a .04 increase in the alpha level (.72) when ‘don’t know’ was coded to missing. To evaluate whether this slightly more ‘reliable’ measure had a significant impact on the results the overall measure of informal social control was recalculated using the measure of perceived health risk when ‘don’t know’ = missing and the main and interaction effect models were re-run. These analyses indicated minimal changes in only the main effects models.
measure of personal disapproval toward cannabis consumption. Specifically the students were asked how they felt or would feel about someone 18 years of age or older trying cannabis once or twice and how they felt about someone 18 years of age or older smoking cannabis regularly. Students were asked to respond to these questions based on a three-point scale (1 = do not disapprove; 2 = disapprove; 3 = strongly disapprove). These variables were recoded so that those who did not disapprove were given a score of 0 and strong disapproval was scored at 2. These variables were then summed creating a new variable (PDISAP) with scores ranging from 0 to 4 reflecting increasing levels of personal disapproval of cannabis use. The mean level of personal disapproval is 2.05 with a standard deviation of 1.51 and the reliability of this measure is .84.

Perceived Parental Disapproval

Perceived parental disapproval of cannabis use was created from two items regarding attitudes toward differential levels of use. The students were asked to indicate on a four-point scale (1 = strongly disapprove; 2 = disapprove; 3 = do not disapprove; 4 = don’t know) how their parents feel or would feel about them trying marijuana once or twice and/or using marijuana regularly. Given that the important aspect of this variable is the element of disapproval, those who responded ‘don’t know’ were given the same score as ‘do not disapprove’. These variables were recoded with values ranging from 0 to 2 whereby 2 represents strong disapproval and as with personal disapproval, these variables were then summed creating a new variable (PARDIS) with scores ranging from 0 to 4 reflecting increasing parental disapproval of cannabis use. The mean level of parental disapproval is
3.24 with a standard deviation of 1.26 and the reliability of this measure is .79.

**Perceived Availability of Cannabis**

Cannabis availability was assessed by a six-point scale (1 = I do not know what cannabis is; 2 = impossible; 3 = very difficult; 4 = difficult; 5 = easy; 6 = very easy to get cannabis) indicating how easy or difficult it is for students to obtain cannabis. Those who said it was very easy for them to get cannabis were given a score of 0 and those who said it was impossible for them to get the drug were scored 5. Students who indicated not knowing what cannabis was (N=226) were given the score of 2, situated between those indicating easy versus difficult access to cannabis. The rationale behind this particular coding scheme was that those students who did not know what cannabis was would likely not find it ‘easy’ to get. However, it was not clear whether this response was indicative of a stronger level of informal social control than those who said it was ‘impossible’ to get cannabis if they wanted it. This rationale was further supported by a separate analysis of the initial variable measuring availability whereby those students who reported not knowing what cannabis was were removed from the analysis and a new mean (0 = 3.4) was calculated. These results suggest that if a mean substitution procedure was used to reconcile the question about how to code the ‘don’t know’ response category, these respondents would fall between the ‘difficult’ and ‘easy’ response options.

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43 An analysis of those indicating not knowing what cannabis was reveals 96.5% (N=218) of the respondents to be abstainers. Of the remaining eight students three (1.3%) were moderate users and 5 (2.2%) were missing.

44 Excluding ‘don’t know’ from the initial variable measuring availability and making the necessary recode the variable was coded such that impossible = 1, very difficult = 2,
The availability measure was therefore recoded to range from 0 to 5 and reflected increasing levels of informal social control (HIAVAIL) with 'don't know' coded as 2. The mean score on this new measure was 2.05 with a standard deviation of 1.94.

*Peer Cannabis Use*

Peer cannabis use was measured using an ordinal scale that asks the students how many of their close friends had used cannabis in the last 12 months. The scale was coded from 1 to 5 corresponding to the following options: none, some, about half, most and all of my friends. This variable was recoded in the direction that would reflect greater informal social control. The new variable (PEERUSE) ranged from 0 (all of my friends use cannabis) to 4 (none of my friends use cannabis) with a high score representing high informal social control and a low score indicating low informal control. The mean score on this measure was 2.98 with a standard deviation of 1.21.

**Composite Measure of Informal Social Control**

As reviewed in Chapter 2 (see section 2.5), the literature has identified various measures of informal social control and there is a body of research that has examined the effects of these individual items on different offending outcomes. For the purpose of this thesis however, I am interested in evaluating whether these items can be considered indicators of the same construct and if a composite overall measure of informal social control could be difficult = 3, easy = 4 and very easy = 5. The mean score of this measure, as reported in the text, was 3.4 suggesting that "don't know" could be substituted into the position between easy and difficult in order to retain the information.
developed.

The first step of this process involved a principal components factor analysis of the five items representing measures of informal social control to evaluate whether they measured the same concept. The results of this analysis indicated all five items loaded on a single factor with an eigenvalue of 2.66. The individual factor loadings were: peer drug use (.80), personal disapproval (.80), availability (.75), perceived health risks (.75) and parental disapproval (.50).

It appears then, that the five items of informal social control measure the same concept and can form a single construct. To further evaluate this measure a reliability analysis was performed on the five measures that comprise informal social control. The results of this test indicated a very good reliability with an alpha of .73.

A composite measure of informal social control was then created by summing the five component variables. The variable informal social control (INFORMAL) ranges from 0 to 28 with higher scores indicative of greater levels of informal social control. The average score on this variable is 16.54 with a standard deviation of 6.5.

3.4. Data analysis strategy

Descriptive statistics and bivariate correlations are provided for all variables used in my analysis. This portion of the analysis illustrates the distribution of the school and family stressors and informal social control across the three user groups (abstainer, moderate and problem user) and indicates whether these variables are associated with differential cannabis use.

Following the bivariate analysis, logistic regressions are conducted. These analyses
estimate the extent to which the experience of familial and school stressors and informal social control affect the probability of differential cannabis use. I am empirically and theoretically interested in whether informal social control moderates the association between stress and the probability of differential cannabis use.

**Nested Dichotomies**

The statistical analyses in this thesis are conducted using the nested dichotomy approach to modelling polychotomous data. Since I am interested in predicting the probability of differential cannabis use outcomes, logistic regression is an appealing and appropriate statistical procedure. However, logit models are limited in that they apply only to dichotomous dependent variables (Fox, 1997). Logistic regression is therefore useful for evaluating the simple (and frequently used) cannabis use versus no-use dichotomy as the dependent variable. However, when considering cannabis use as a dependent variable there are multiple categories that constitute this behaviour (i.e., cannabis use should be conceived of as more than use versus non-use). Indeed, while abstainers clearly define one group of adolescents, there are varying levels of use such as moderate and problem level use that are lost when considering a simple use/non-use response. Consequently, it is preferable to model polychotomous data with categories that represent an ordered progression through stages of involvement in drug use so as not to ignore some of the categories (Fox, 1997).

One approach to modelling polychotomous data is nested dichotomies (Fox, 1997). This approach constructs a set of nested dichotomies of successive binary partitions of the categories of the polychotomous variable. Independent logit models are then fitted to each
dichotomy. In this thesis a trichotomy of 'user groups' is created to estimate the models predicting adolescent cannabis use. Based on Fox's (1997) description of the nested dichotomy approach, the dichotomies are constructed in such a manner that the "likelihood for polytomous dependent variable is the product of the likelihoods of the dichotomies" (p. 313). Therefore, although the models are fitted to data from the same sample the models are statistically independent.

If the dichotomies selected for analysis are purely arbitrary then it is suggested that alternative methods be used (Fox, 1997). Thus, while it is recognized that the set of nested dichotomies selected is not unique, the groups selected to represent the polytomy should be substantively compelling. The basic progression regarding drug use is from abstaining to use. Individuals may pass through stages of escalation of use to problem use. In this thesis, the trichotomy (1) abstainer, (2) moderate cannabis user and (3) problem cannabis user is used and the following system of nested dichotomies are evaluated (see Figure 3.2 for illustration):

1. Abstaining versus using: \{1, (2 3)\}.
2. Among those who use cannabis, moderate use versus problem use: \{2, 3\}.

**Figure 3.2. Illustrative Nested Dichotomies**
**Logistic Regression Analysis**

The outcome variable used in these analyses is binary and non-normally distributed. Consequently, statistical techniques that assume continuous, normal distributions for the dependent variable or assume linear relationships between the dependent and independent variables are inapplicable for these measures. The violation of such assumptions biases estimates derived from both ordinary least squares (OLS) and linear probability techniques (Aldrich and Nelson, 1984). An incorrect assumption of linearity can result in a significant underestimation of OLS coefficients. Parameter estimates are unbiased but not efficient (i.e., sampling variances are inflated), and this increases the probability of Type II error (not finding a difference when there is one).

An alternative to OLS and linear probability estimation is to express the outcome variable as a non-linear probability function. Non-linear probability models use ratios and logarithmic transformations to express the non-linear probability model as a linear continuous one. Logistic regression incorporates aspects of probability and linearity and predicts the natural logarithm of the odds of the dependent variable as a linear function of a set of independent variables (Alba, 1987). In logistic regression, the dependent variable assumes the functional form:

$$\text{LN} \left( \frac{\Pi}{1 - \Pi} \right)$$

where $\Pi$ refers to the probability of being in a particular category of a variable. This is referred to as the logit (Agresti, 1990; DeMaris, 1993; Morgan and Teachman, 1988).

In logistic regression, the parameters are estimated using maximum likelihood...
estimation (MLE). The goal of MLE is to use the sample data to make estimates of the parameters that maximize the likelihood of having obtained these observed sample values (Eliason, 1993). The variable set that yields the highest probability comprises the maximum likelihood estimate. For large samples, MLE parameter estimates are unbiased, efficient and normally distributed allowing for standard tests of significance (Eliason, 1993).

Logit coefficients may be interpreted as the change in the log odds of being in a particular category with a one unit change in the independent variable (Aldrich and Nelson, 1984). Proportional changes in the odds can be attained by exponentiating a given coefficient.

3.5. The final logit model and stages of logistic analysis

The final logit model consists of eight independent variables. The demographic variables incorporated in the model are gender, age and socio-economic status. Of the remaining five variables, four are stressors consisting of two family and two school variables. The family stressors examined are family relationships and family structure and problems with school and drug use at school are the school stressor variables. The final independent variable in the logit model is the measure of informal social control.

For these analyses two nested dichotomies were constructed to reflect the polytomous dependent variable cannabis use. The first dichotomy consists of the abstainers versus all users and the second extends the analysis into the ‘user’ group and captures the distinction between moderate and problem users. The logit models were then fitted to these dichotomies in turn (see Figure 3 for the illustration of the full logit models that are estimated in these analyses). In doing so I am able to estimate the extent to which stressors and informal social
control not only influence the likelihood of adolescents using cannabis but how these variables affect the degree to which they become involved in cannabis use. To this end this thesis provides a broad comparison of how different stressors and informal social control affect the probability of differential cannabis use.

The series of logistic regression analyses estimates the degree to which family and school stressors and the level of informal social control affect the probability of differential cannabis use among adolescents. There are five stages to this analysis and each of the models builds upon the previous one. These models are illustrated in Figure 3.3\textsuperscript{45}.

Model 1 examines the effect of the three demographic control variables; the two family stressors are entered in Model 2 and the direct effects of these variables on differential cannabis use are estimated controlling for the demographic factors. In the third stage, the two school stressors are added controlling for family stressors and the three demographic variables. Model 4 estimates the direct effect of informal social control (ISC) on differential cannabis use and finally model 5 evaluates the interaction effects between informal social control and each of the four stressors on the probability of differential cannabis use.

\textsuperscript{45} The final logit model predicting the probability of problem cannabis use is identical to that displayed in Figure 3.3 with the exception of the outcome variable reflecting problem use.
3.6. Measure of cumulative stress

Another goal of my research is to estimate the effects of cumulative stressors on the probability of any cannabis use and problem cannabis use. The first step of this analysis therefore involves devising a method for counting the number of stressors each adolescent experienced. Four stressors are included in this thesis and therefore the range of stressors experienced will range from 0 to 4. The initial construction of the four stressors generated two dichotomous variables, family structure (coded 0 = intact and 1 = disrupted) and drug use is a problem in your school (coded 0 = not a problem and 1 = problem). No further recodes were necessary for the two dichotomous variables as the score of '1' reflects the presence of the stressor and '0' indicates its absence. Poor family relationships and problems with school however, were created as continuous variables ranging from 0 to 17 and 0 to 21 respectively.
These variables reflect a continuum of stress whereby low scores are indicative of experiencing minimal problems with their family relationships and/or with school and high scores reflect serious problems in these domains. To facilitate the counting of the stressors, these variables were recoded into dichotomous measures. To do this it was necessary to decide on a cut point for each of these variables that would reflect the presence, versus absence, of the stressor.

The purpose of these analyses is to examine adolescents who are at particularly high risk for cannabis use. Therefore, I did not want to include those adolescents who had relatively low scores on the continuous variables (problems with school and/or poor family relationships) as experiencing the stressor. A common procedure used in the addiction research field to estimate the effects of risk factors on drug use is to select the top 20th percentile as the cut point for high risk (Newcomb, 1992). In the new dichotomous measure, then, a score of 0 does not necessarily reflect 'no risk', but rather is indicative of not being at 'high risk'. This procedure was adopted in these analyses so that those students who scored in the top 20th percentile represented those adolescents who had experienced the stressor. The two ordinal variables were subsequently recoded so that those below the top 20th percentile were given a score of '0' and those at or above the top 20th percentile were coded 1.

The next step was to create a new variable that reflects the number of stressors

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46 A factor analysis of the four stressors was conducted to examine the weight of each of the factor loadings. If the results had shown great variation in these values I would have considered using these values as stress scores. However this analysis indicated very similar factor loadings for these items.

47 The results of the recoding procedure indicated that 26 percent of adolescents score 1 on the new measure of problems with familial relationships and 21 percent were given a score of 1 on the recoded measure of problems with school.
experienced. Summing the four stressors created a new measure (COUNT) ranging from 0 to 4 with 4 representing the maximum number of stressors the adolescent could experience and 0 indicating no stressors. The mean score on this measure was 1.46 and the standard deviation is .898.

3.7. Other statistical consideration

Multicolinearity and Outliers

Logistic regression is sensitive to very high correlations among the predictor variables (Fox 1997). To assess whether there was any multicollinearity among the variables in these analyses collinearity diagnostic tests were conducted in SPSS to produce a conditioning index and variance inflation indicators. One method of assessing whether there are particularly high intercorrelations between the independent variables is to examine the tolerance of each variable\(^4\). If tolerance equals 0 this implies perfect multicollinearity and regression is impossible. Results are considered less stable if tolerance is below .2 or .1. The results of the analysis revealed high tolerance levels for all of the variables used in this analysis. The lowest observed tolerance level is .73 for informal social control. This finding indicates that 73% of the variation in this variable is unique or independent from the other variables. Given the tolerance ranges from .73 to .95 there does not appear to be a problem with multicolinearity among these variables.

Like OLS, logistic regression results can be sensitive to outlier cases with extreme

\(^4\) Tolerance of \(X_k\) is the proportion of \(X_k\)'s variance not shared with the other \(X\) variables: tolerance = 1 - \(R^2_k\) (Hamilton, 1992).
values on one variable or a combination of variables. As such, outliers not only produce both Type I (finding a difference when there really is not) and Type II (not finding a difference when there is one) errors, but may also affect generalizability because the results have been overly determined by the outliers (Fox 1997).

One means of identifying potential outliers is Mahalanobis distance. The criterion for multivariate outliers is Mahalanobis distance at \( p < .001 \) and is evaluated as chi-square with the number of degrees of freedom equal to the number of variables in the analysis (in this case \( df = 8 \)) (Tabadinick and Fidell, 1996). Any case with a Mahalanobis distance \( X^2 (8) > 26.12 \) is classified as a multivariate outlier. The results of this procedure indicated that there were no outliers in the data.

**Missing Data**

In order to assess the amount of missing data in these analyses a count of the missing data was conducted on all of the control and independent variables in the model. This procedure indicated that 84 percent of the data are fully complete. Of the 16 percent missing data, 13.1 percent are cases missing on one item only. An analysis of those missing on one item indicates that the largest amount of missing data is found in the variable representing family relationships (POORREL). Recall that those adolescents who indicated that their parent(s) were deceased were purposely excluded from the analysis. Because this constitutes the majority of the missing data, no data substitution procedures were conducted.
**Weighted versus Unweighted Data**

Sampling weights, clustering and stratification are three important characteristics associated with survey data related to the design of data collection procedures. Although in many cases the sample units of observation (i.e., students) are selected through a random process, this does not necessarily imply that there was an equal probability of selection for all of the observations. Therefore, if weights are not included in the analyses there is the risk of producing biased estimates as well as inflating standard errors. Another feature of some survey designs is that instead of observations being sampled independently, clusters (i.e., households, city blocks) may be used. Observations within the same cluster are not independent. Therefore, if estimators that assume independence are used, the standard errors generated are too small and the p-values and confidence intervals are compromised. Different groups of clusters are also frequently separately sampled within strata. This stratification may also generate 'small' sampling errors. Therefore, sampling weights need to be used in order to generate accurate point estimates and clustering and stratification issues need to be taken into consideration so as not to produce sampling errors that are smaller than they should be.

The OSDUS is based on a cluster sample that over-represents students in grade 13 and under-represents those in grade 7. The implication of this is that there is the potential to underestimate the variance thereby overestimating the significance level. Therefore if the design effects are ignored, it is possible that some or all of the significant coefficients observed may in fact be non-significant when the design effect is included in the analysis.

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49 Levy and Lemeshow (1999) provide a more detailed discussion of the implications associated with ignoring sample design effects and weighting issues.
To avoid these problems, the logistic regression analyses in this research are conducted in the statistical program Stata. This program estimates models using weighted data and controls for design effects due to stratified sampling and clustering issues. The general descriptive and preliminary bivariate analyses are run in SPSS using weighted data. Given that this series of analyses is meant to provide a general overview of the background characteristics of the sample, the weighted data procedure in SPSS was regarded as sufficient. The more complex and substantive models are evaluated using Stata.

3.8. Summary and conclusion

This chapter described the various features of the 1997 wave of the Ontario Student Drug Use Survey used in this research. The first portion of this chapter presented an overview of the design features of the data set. This was followed by a description of the variables used in this research: sources of stress, informal social control and the dependent variable, differential cannabis use. Finally, in this chapter the analytical techniques used in this research were discussed. These included the nested dichotomy approach and logistic regression.

The following chapters report the results of a series of analyses estimating the effects of informal social control on differential cannabis use. These chapters begin with a general comparative overview of the sample of adolescents. This is followed by an analysis of the main effects and interaction effects models as they predict differential cannabis use.
Chapter 4
Predicting Cannabis Use among Adolescents

4.1. Introduction

During adolescence, young people may be exposed to numerous family and school stressors. One potential outcome associated with the experience of these stressors is cannabis use. Previous studies, discussed in Chapter 2, have demonstrated that a relationship exists between cannabis use and the experience of poor grades, low academic aspirations and problems with school. This research also reveals an association between familial factors and cannabis use. For example, poor relationships with one's parents or coming from a broken home have been identified as correlates of adolescent cannabis use.

Not all adolescents use cannabis, however, nor do those who use, do so in the same amounts and ways. One goal of this research is to examine the extent to which various stressors and/or informal social control predict different levels of cannabis use among adolescents. This chapter describes the effects of: a) demographic variables; b) four sources of stress and c) informal social control on the probability of cannabis use. Logistic regression is used to isolate the independent effects of the four stressors and informal social control on cannabis use by controlling for other variables that may also be associated with adolescent cannabis use. These analyses examine which family and school stressors place adolescents at greatest risk for any cannabis use and assess the direct, as well as moderating role of informal social control. This chapter concludes with a summary of the main research findings.
4.2. **Overview of the model**

There are eight independent variables included in the model. Of these, five are independent variables: four capture particular stressors and one measures the extent of informal social control. Of the four stressors, two are dichotomous measures and two are quasi-continuous variables. Family structure was coded so that a value of 1 was indicative of a disrupted family and 0 implied an intact family status. Similarly, perceptions of school drug use as a problem was coded 1 and 0 was assigned to those who did not see drugs as a problem in their school. The variable ‘family relationships’ was created as a quasi-continuous measure ranging from 0 - 17, with high scores indicating poor family relationships. The variable measuring problems with school ranged from 0 - 21 and again, higher scores indicate more problems with school. Finally, the measure of informal social control is a continuous variable that ranges from 0 to 28 with higher scores reflecting increased levels of informal social control. There are also three control variables in the model, gender, age and socio-economic status. Gender is measured as a dichotomous variable (0 = female, 1= male). Age and socio-economic status are ordinal measures\(^{50}\).

In addition to evaluating the direct effects of the variables on cannabis use, I also examine the potential moderating influence of informal social control. Moderators, or buffers, are variables that affect the initial relationship between stress and outcome. These factors, therefore, produce interaction effects. The general moderating model hypothesizes that the

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\(^{50}\) Given that the Ontario Student Drug Use Survey targets high-school students, the age variable ranged from 10 years of age or younger to 20 years of age or older. Socio-economic status was based on a measure of the student’s perception of their family financial situation and was coded 1= well-above average; 2= somewhat above average; 3= about average; 4= somewhat below average and 5= well-below average.
combined effect of stressors with certain resources (informal social control in this case) may serve to either exacerbate or attenuate negative outcomes. Figure 4.1 displays the general moderating relationship between the variables in this thesis.

**Figure 4.1. Moderating (buffering) Model**

![Diagram](image)

In this analysis, the central issue is whether informal social control acts as a buffer, reducing the effects of the family and school stressors on the probability of cannabis use. More specifically, this chapter examines the hypothesis that among those who experience school and family stressors, the probability of cannabis use will be reduced for those adolescents who have higher levels of informal social control. An example of a significant interaction that might be found in this thesis is illustrated graphically in Figure 4.2.

In this graph the slope of the line indicating the relationship between informal social control and probability of cannabis use is greater for students with a disrupted family environment than for those with an intact family structure. Therefore, this graph suggests that high levels of informal social control may offset the effects of a disrupted family environment on the probability of cannabis use.

The models estimating the moderating effects of informal social control contain all of the previously described variables as well as four interaction terms. Informal social control
Figure 4.2. An illustration of a significant interaction effect between informal social control and disrupted family status.
(ISC) is interacted with each stressor and interaction terms were successively added to the
main effects model. The four interaction terms include:

ISC x family relations (POOREL)
ISC x family structure (DIS)
ISC x problems with school (EDUCATE)
ISC x school drug use (DSCH).

This chapter is the first component of the nested dichotomies analysis and presents the
results of a series of analyses pertaining to the general distinction between abstainers and
cannabis users. The descriptive characteristics for the total sample, as well as for the
abstainers and users are discussed first. This is followed by a brief overview of the bivariate
correlations between the variables in the model and the dependent variable, cannabis use.
Finally, the multivariate analyses are presented and discussed.

4.3. Descriptive statistics: Sample characteristics

The first set of analyses highlight the summary characteristics of the sample. These
results are intended to provide a general description of the demographic characteristics as well
as the distribution of the stressors and informal social control and are presented in Table 4.1.
The second column in this table summarizes the demographic characteristics of the total
sample, as well as the distribution of the stressors and informal social control. Regarding the
demographic characteristics, the total sample has a mean age of approximately 15 years and
there is a relatively equal distribution of male (48 percent) and female (52 percent) students.
The mean level of socio-economic status for the sample is 2.54 (recall higher scores on this
measure reflect lower socio-economic backgrounds).

The distribution of the four stressors and informal social control is also presented in this column. Considering first the distribution of family stressors, within the total sample, students have a mean level of 6.16 on the measure of poor family relationships (this is below the mid-point of this measure meaning that, on average, this sample does not report extensive problems with their families) and 26 percent report a disrupted family background. The average score on the measure of problems with school\textsuperscript{51} was 7.05 (this represents the lower third of the scale, indicating that the overall sample experiences few difficulties with school) and 76 percent of the students perceive drug use to be a problem in their school. The mean level of informal social control for the total sample of students is 16.73. Therefore, on average, among the total sample, adolescents report slightly above average levels of informal social control in their lives.

The third and fourth column of this table describe the sample characteristics and the distribution of the stressors and informal social control for both groups. As shown in the table, on average, abstainers are 14 years of age and cannabis users are 16 years old. Less than half of the sample of abstainers are male (46 percent) and slightly over half (53 percent) of the users are male. Finally, regarding socio-economic status, abstainers report an average level of 2.51 and users 2.62 (tending toward an indication of below average family financial situation). The distribution of stressors and informal social control among the abstainers and users is also presented in the table.

\textsuperscript{51} Recall this scale ranges from 0 - 21 with higher scores reflecting the experience of greater problems with school.
Table 4.1
Sample characteristics for total sample, abstainers and users

<table>
<thead>
<tr>
<th>Sample Characteristic</th>
<th>Total Sample N = 1936</th>
<th>Abstainers N = 1360</th>
<th>Users N = 576</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14.91</td>
<td>14.46</td>
<td>16.02</td>
</tr>
<tr>
<td>Male</td>
<td>48%</td>
<td>46%</td>
<td>53%</td>
</tr>
<tr>
<td>Socio-economic status&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.54</td>
<td>2.51</td>
<td>2.62</td>
</tr>
<tr>
<td>(1-5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor family relationships&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.16</td>
<td>5.43</td>
<td>7.99</td>
</tr>
<tr>
<td>(0-17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disrupted family status (non-intact=1)</td>
<td>26%</td>
<td>22%</td>
<td>33%</td>
</tr>
<tr>
<td>Problems with school&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.05</td>
<td>6.48</td>
<td>8.47</td>
</tr>
<tr>
<td>(0-21)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug use is a problem in school (problem=1)</td>
<td>76%</td>
<td>75%</td>
<td>79%</td>
</tr>
<tr>
<td>Informal social control&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16.73</td>
<td>19.66</td>
<td>9.92</td>
</tr>
<tr>
<td>(0-28)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Values presented are means
Regarding the family stressors, abstainers report an average score of 5.43 on the measure of poor family relationships whereas users score 7.99. Among the abstainers, 22 percent indicate a disrupted family background and 33 percent of the users report the same. The average score of the measure of problems with school is 6.48 for the abstainers and 8.47 for the users. Three-quarters of the abstainer group (75 percent) and close to 80 percent of the user group indicate perceptions of drug use as a problem in their school. Finally, abstainers report an average score of 19.66 on the variable of informal social control (recall higher values represent stronger levels of informal social control) and the score for the users is 9.92.

I turn now to the bivariate analysis to determine if there are significant differences in the sample across the different user groups. To then isolate the effects of the stressors on cannabis use, a series of multivariate models are estimated to determine the effects of family and school stressors on adolescent cannabis use. These analyses will control for the demographic variables.

4.4. Bivariate analysis

This analysis provides a preliminary examination of the relationships between the variables in the model and the likelihood of cannabis use. Zero-order correlations are presented in Table 4.2 and illustrate the extent to which each of the control variables, sources of stress and informal social control independently affect the probability of cannabis use.\(^{52}\)

\(^{52}\) A positive correlation indicates that the variable increases the likelihood of cannabis use and a negative correlation therefore signifies a decrease in the likelihood of cannabis use.
Table 4.2
Bivariate relationships: Demographic characteristics, stressors, informal social control and cannabis use

<table>
<thead>
<tr>
<th>Variable</th>
<th>Zero-Order Correlation(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.280***</td>
</tr>
<tr>
<td>Male</td>
<td>.067**</td>
</tr>
<tr>
<td>SES</td>
<td>.047*</td>
</tr>
<tr>
<td>Poor family relationships</td>
<td>.311***</td>
</tr>
<tr>
<td>Disrupted family status</td>
<td>.108***</td>
</tr>
<tr>
<td>Problems with school</td>
<td>.266***</td>
</tr>
<tr>
<td>Drug use is a problem in school</td>
<td>.023</td>
</tr>
<tr>
<td>Informal social control</td>
<td>-.680***</td>
</tr>
</tbody>
</table>

\(^1\) Correlations are based on Pearson r statistics

* p<.05     ** p<.01     *** p<.001
Results

All of the coefficients in this model are in the expected direction and statistically significant except perceived drug use in school. Positive and significant bivariate relationships are observed for the demographic control variables and three of the four sources of stress. This finding indicates that the demographic variables and sources of stress have a significant direct effect that increases the likelihood of cannabis use, at least at the zero-order level.

More specifically, Table 4.2 demonstrates that the likelihood of cannabis use is greater for males, older students and those from families with lower socio-economic backgrounds. Furthermore, those students who report poor family relationships or who come from non-intact families, or who report more problems in school are more likely to use cannabis. School-level drug use, however, is not significantly correlated with cannabis use. That is, the odds of cannabis use are no greater for those who report that drug use is a problem in their school than those who do not hold this perception. Finally, the zero-order correlations also indicate, as expected, a negative and significant relationship between informal social control and cannabis use suggesting that the presence of this resource will reduce the likelihood of cannabis use.

The zero-order correlation results provide a preliminary indication of the relationships between each of the variables in the model and the likelihood of cannabis use, without controlling for the various demographic characteristics. However, it is rarely, if ever the case

53 Recall that the socio-economic status variables were coded in the direction of economic disadvantage (1 = well above average; 5 = well below average). Therefore positive coefficients mean higher levels of economic disadvantage are associated with a greater probability of cannabis use.
that adolescents experience a single stressor in their lives. As such, in the next set of analyses a series of models that control for the demographic factors and incorporate each of the four stressors and the measure of informal social control are examined.

4.5. Logistic regression: Multivariate analyses

In this analysis, the likelihood of cannabis use is regressed on the four sources of stress and informal social control, controlling for the demographic variables. Here I present a series of results predicting the probability of cannabis use. The first step in addressing the issue of cannabis use predictors is to estimate the main effects of the variables included in the model. This analysis addresses whether the four stressors and informal social control have significant direct effects on the probability of cannabis use. Following this, a series of models are evaluated estimating the moderating effects of informal social control on the same outcome variable. Recall that informal social control reflects behavioural guidelines that reside in the individual’s micro-environment as opposed to those residing and enforced by the state (i.e., formal social control such as law). This research answers the question whether and to what extent informal social control prevents or limits the consumption of cannabis. Thus, this portion of the analysis examines the extent to which informal social control buffers or moderates the relationship between the stressors and cannabis use. To this end, interaction terms are created to estimate the interaction between informal social control and each of the family and school stressors.

Table 4.3 presents the multivariate logit models for the first comparison using the nested dichotomy approach. Here cannabis use is regressed on the four stressors, informal
### Table 4.3
Logistic regression analysis of main and interaction effect models comparing abstainers to all users

*(N = 1626)*

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>.226*</td>
<td>.228*</td>
<td>.037</td>
<td>.080</td>
<td>.056</td>
</tr>
<tr>
<td>Age</td>
<td>.363***</td>
<td>.342***</td>
<td>.398***</td>
<td>.231***</td>
<td>.229***</td>
</tr>
<tr>
<td>SES</td>
<td>.116</td>
<td>-.082</td>
<td>-.127</td>
<td>.058</td>
<td>.061</td>
</tr>
</tbody>
</table>

| Disrupted family status  | .619***| .514**| .634* | .665  |
| Poor family relationships| .195***| .151***| .074**| .028  |
| Problems in school       | .182***| .070**| -.074 |       |
| Drug use is a problem at school | -.164 | -.059 | -.688 |       |

| Informal social control (ISC) |       |       | -.373***| -.515***|

| Poor family relations*ISC   |       |       | .004    |       |
| Disrupted family*ISC        |       |       | -.003   |       |
| Problems with school *ISC   |       |       | .011    |       |
| Drug use at school*ISC      |       |       | .047    |       |

| Constant                  | -6.79 | -7.43 | -8.96  | -.232 | 1.747 |
| F (df)                    | 59.67***| 43.08***| 22.31***| 52.72***| 27.60***|

*p<.05    ** p<.01    *** p<.001
social control and the demographic control variables. Model I presents the baseline model, including the demographic control variables only. The effects of the family and school stressors on the probability of cannabis use, controlling for the demographic variables, are then presented in Models II and III, respectively. Finally, informal social control is added to the regression equation and the results of the full main effects model are presented in Model IV.

The purpose of entering the family and school stressors in separate models was not to evaluate whether the fit of the model predicting cannabis use significantly improves. Rather, there are specific issues I want to examine with respect to the effects of these stressors. That is, as reviewed in Chapter 2, there has been much debate over the effects of family structure versus family relationships on outcomes such as cannabis use. Some studies find that when family relations are entered into a model, the effects of family structure are significantly reduced. These findings, however, are equivocal and I hope to add to this area of research with these analyses. Further, problems experienced in one life domain may affect other aspects of an adolescent’s life. In particular, stressors and strains in the family may have consequences for the adolescent in their school environment. Therefore, by including the school stressors in a separate model controlling for the effect of family stressors, I can more accurately isolate the effects of school stressors on cannabis use outcomes.
Results

Baseline Model

Model 1 in Table 4.3 presents the results of what I will refer to as the baseline model that regresses the three demographic variables on cannabis use. The results of this analysis indicate that, when considered simultaneously, two of the three demographic variables significantly increase the probability of cannabis use. That is, there is a greater probability that males and older students use cannabis compared to females and younger students. Socio-economic status is no longer observed to have a significant effect on the likelihood of cannabis use, suggesting that age and gender have a stronger impact on use. There is some discrepancy in the literature regarding the relationship between socio-economic status and drug use (Johnstone, 1994). Some studies find evidence that suggests socio-economic status is an important predictor of drug use, including cannabis (Bachman et al., 1980; Drufoos, 1990; Jessor, Chase and Donovan, 1980; Murray, Perry, O’Connell and Schmid, 1987; Smart, Adlaf and Walsh, 1994). Others also find an association between these variables, but conclude that this relationship is indirect in nature (Johnstone, 1994). The findings presented in this thesis however, seem to support the body of literature that suggests socio-economic status has little effect on cannabis use (Brook et al., 1988; Hawkins, Catalano and Miller, 1992).

54 The Ontario Student Drug Use Survey is based on a cluster sample that over-represents students in grade 13 and under represents those in grade 7. As such there is the potential to under-estimate the variance and, consequently, over-estimate the significance (p) value. The statistical program Stata is designed to take these design effects into consideration by estimating models using weighted data as well as compensating for stratified sampling and cluster issues.

55 One difficulty about drawing conclusions about the effect of socio-economic status on drug use stems from the use of different measures (i.e. education level of parents, occupation, financial status, postal code of residence) of this construct.
Effects of Stressors on the Probability of Cannabis Use

Models II and III in Table 4.3 estimate the main effects of the family and school stressors on the probability of cannabis use when the effects of the demographic variables are statistically controlled. Model II estimates the results of the logistic regression analysis when the two family stressors are included in the equation\(^\text{56}\). The findings indicate a significant effect of both family structure (\(b = .619, p = .002\)) and family relationships (\(b = .195, p < .001\)) on the likelihood of cannabis use when controlling for the demographic variables.

Family structure has frequently been identified as a correlate of adolescent delinquency, including cannabis use. I hypothesized that adolescents who were not living with both of their natural parents would have higher odds of using cannabis than those who were. The results presented in Model II support this hypothesis; adolescents from a disrupted family background are significantly more likely to use cannabis than those living with both 'natural' parents. Indeed, the odds of cannabis use are 86 percent higher among those students with a non-intact family than those from intact homes (\(e^{.619} = 1.86\))\(^\text{57}\). The significance of family structure in these findings supports those found in other cross-sectional and longitudinal research that demonstrates that adolescents from single or step-parent families are more likely to initiate cannabis use than those from two-parent homes (Flewelling and Bauman, 1990; Hoffman, 1993; Paternoster, 1989; Smith and Paternoster, 1987; Wells and Rankin, 1991).

Not all research, however, finds evidence of an effect of family structure on adolescent

\(^{56}\) I entered these stressors as their own block so as to comment on the family structure versus relations debate in the literature.
\(^{57}\) 'e' represents the exponential of the logistic regression coefficient and provides the proportional change in the odds.
cannabis use (Hennessey et al., 1978; Hundlesby and Meicer, 1987; Van Voorhis et al., 1988; White et al., 1987). Some researchers argue that the family’s influence on adolescent behaviour has less to do with the structure of the family unit than it does with family relationships, and suggest that the effects of family structure will not be as robust when family relationships are included in the analysis. As hypothesized, then, those students who report greater problems with their family relationships have a greater probability of cannabis use than those who have good familial relationships. That is, poor family relationships have a direct effect on the likelihood of adolescent cannabis use such that for every unit increase in poor family relationships, the odds of cannabis use increases by 22 percent \( (e^{-1.95} = 1.22) \). These results are consistent with other research that identifies the quality of family relationships as an important predictor of adolescent cannabis use (Brook et al., 1992; Pandina and Scheule, 1983; Boyle and Offord, 1986; Adlaf and Ivis, 1996; Kandel and Andrews, 1987). However, as illustrated in this model, family structure also has a significant direct effect on the likelihood of cannabis use. Therefore, it does not appear that the influence of the family on cannabis use stems solely from the strains associated with poor family relationships.

Overall then, these findings reinforce the importance of the family unit with respect to cannabis use behaviours (Amato and Keith, 1991; Flewelling and Bauman, 1990; Hoffman, 1993). The odds of cannabis use are noticeably greater for those adolescents who experience stressors associated with their family life than those who do not experience problems in this domain.

The school stressors (problems with school and drug use in the school) are incorporated into the regression equation and the results of this analysis are presented in
Model III. Of these two stressors, experiencing problems with school (b = .182, p < .001) is a significant predictor of the probability of cannabis use. Previous studies have documented the relationship between the experience of specific problems with school (i.e. poor grades) and cannabis use (Allison and Dignam, 1990; Bachman, Johnston, O’Malley and Humphrey, 1988; Ennett et al., 1997; Gottfredon and Hirschi, 1990; Friedman, 1985). My research however, has evaluated a continuum of school stress and strain based on a constellation of potential school stressors. These findings indicate that, when controlling for demographic factors and family stressors, every unit increase in problems students experience at school increases the odds of cannabis use by 20 percent (e^{.182} = 1.20). Therefore, the intensification of problems with school clearly exacerbates the likelihood of cannabis use. Youth who fall behind in school and are bored may feel alienated from the system, left out and unwanted. In addition to the effect this has on cannabis use initiation there is also the concern that these adolescents are more likely to drop out of school, which in turn places them at greater risk for drug use (Clayton, 1992).

These results provide partial support for the hypothesis that stressors associated with school increase the risk for cannabis use. That is, while experiencing problems with school significantly increases the risk for cannabis use, perceptions of drug use as a problem in one’s school does not. I hypothesized that perceptions that drug use is a problem in one’s school would significantly increase the likelihood of cannabis use. The findings fail to confirm this proposition. Students who think drugs are a problem at school are no more likely to use cannabis than those who do not hold these perceptions. This suggests that although students may perceive drug use to be a problem in their school, these perceptions do not appear to
directly translate into behaviour, increasing the odds of using cannabis versus abstaining. The preliminary analysis regarding the distribution of this stressor (see Table 4.1) however, indicates that, in comparison to the abstainers, a greater proportion of adolescent cannabis users report problem drug use in their school. This does suggest the possibility that the likelihood of adopting a certain behaviour may depend in part on the extent to which it has been adopted by the community, but that the mechanism through which this operates has yet to be identified. As shall be elaborated more fully in Chapter 7, there are many aspects of the drug use environment at school that remain to be identified, operationalized and incorporated into research studies. A finding of non-significance, however, does have important implications. That is, just because an adolescent is attending a school in which drug use is perceived as a problem does not necessarily imply that they will initiate cannabis use themselves. For those involved in the educational system this finding should be encouraging.

Finally, Model III also shows that age and the family-related stressors remain highly significant predictors of cannabis use. In contrast, when the education variables are entered into the equation, gender no longer has a significant effect on the probability of cannabis use. This finding may shed some light on an aspect of gender that increases the likelihood of cannabis use. Specifically, boys may experience more difficulties in school than girls\(^{58}\) and it is this stressor that influences adolescent male cannabis use. This is an interesting finding and although in need of further exploration, these results may suggest that gender-specific school-based programs could provide a more efficient and effective intervention strategy to reduce

\(^{58}\) The zero-order correlation indicates a positive and highly significant association between gender and problems with school \((r = .150; p < .000)\).
cannabis use initiation.

In addition to estimating the relationship between the experience of the four stressors and cannabis use, I also evaluate the role of informal social control in predicting cannabis use. The relationship between informal social control and cannabis use is examined on two levels. The first set of results addresses the question of whether informal social control has a direct, main effect on the probability of cannabis use. This is followed by an analysis that evaluates the potential moderating effects of informal social control.

**Effects of Informal Social Control on the Probability of Cannabis Use**

The direct effects of informal social control on the likelihood of cannabis use are estimated in Model IV of Table 4.3. This model reports the results of the logistic regression when informal social control is added to the equation. Controlling for the demographic variables and the family and school stressors, informal social control has a statistically significant negative effect on the probability of cannabis use ($b = -0.373$, $p<.001$). This finding indicates that for every unit increase in the level of informal social control, the likelihood of cannabis use is reduced by 31 percent ($e^{-0.373} = 0.69$). This result supports the hypothesis that informal social control decreases the probability of cannabis use. Indeed, it appears that even small increases in an adolescent’s level of informal social control can substantially reduce the odds of cannabis use. The effect of informal social control on the likelihood of problem cannabis use remains to be estimated (Chapter 5). However, these findings provide a preliminary indication of the important role informal social control may play in reducing the likelihood of cannabis use among adolescents. Because little other research has examined the
role of a composite measure of informal social control, these findings need to be replicated\textsuperscript{59}. However, previous research has found that different components of informal social control (i.e., availability, perceived health risks, personal disapproval) are associated with a decrease in the probability of cannabis use. Therefore, these results both support and encourage this area of investigation.

In these analyses I was particularly interested in evaluating whether informal social control buffers the negative effects of family and school stressors on the probability of cannabis use. To estimate these relationships, four interaction terms were added to the main effects model and logistic regression analyses were conducted (Model V in Table 4.3).

Briefly, the findings indicate that informal social control does not moderate the effects of any of the stressors on the probability of cannabis use. Therefore, the negative effects of the family and school stressors on the probability of cannabis use are not buffered by informal social control.

To ensure that the potential interaction effect was not being conditioned by other potentially relevant factors, additional three way interaction models were estimated and found to be non-significant. It is possible that the non-significant findings are a result of another variable that is affecting the interactions between informal social control and the four stressors. Specifically, the interaction effects may be conditioned by other factors such as gender and age. Women may be more concerned about rule breaking and the risk of informal

\footnote{Some research has estimated the effects of informal sanctioning indices. However, these tend to be based on a few items only and do not cover a broad range of sources of informal social control (see Paternoster, Saltzman, Waldo and Chiricos, 1985 for example).}
sanctions than males (Miller and Simpson, 1991) just as younger adolescents may also be more concerned about these threats. Therefore, a series of three way interactions (informal social control x stressors x gender and informal social control x stressors x age) were tested.

Drawing on the stress process literature, I proposed that informal social control, like mastery and self-esteem, might act as a resource in the lives of adolescents that would insulate them from the deleterious effects of various stressors. Psychosocial resources typically identified in the mental health literature (mastery and self-esteem) promote resiliency in youth to the effects of stress because they directly relate to their sense of self. This may not be how informal social control, as I have measured it here, is internalized by adolescents. Informal social control may encourage youth to seek alternate ways of expressing themselves (the direct effect) that will be less risky for their health or not alienate their peers for example, but does not alter the way they experience the stressor like other resources might. The lack of moderating effects, however, does not diminish the importance of the direct effect informal social control has on cannabis use. Among adolescents, there is a direct negative effect of informal social control on the probability of using cannabis in that, high levels of informal social control substantially reduce the odds of cannabis use. The magnitude of this finding suggests that initiatives directed towards bolstering this resource should be tested further for their effect on reducing the likelihood of cannabis use initiation.

Further, this analysis has focused on the use versus no-use dichotomy, and thus the moderating effects of informal social control on the probability of problem cannabis use remain to be examined. It remains possible that while informal social control does not appear to buffer the effects of stress on the likelihood of any level of cannabis use, it may influence
problem cannabis use in this manner.

4.6. Summary of main findings: Abstainers versus users

The focus of this series of analyses was two-fold. First I estimated the direct effects of the family and school stressors on the likelihood of cannabis use. This was followed by an analysis of the role of informal social control (both as it directly affects cannabis use and as it buffers the effects of the stressors). This type of analysis has characterized much of the cannabis research involving youth. Second, this study also investigates the role of informal social control in understanding adolescent cannabis use.

The analyses were conducted in two stages. The first estimated the main effects of the four stressors and informal social control on the probability of cannabis use, and the second stage evaluated the interaction effects between each of the stressors and informal social control. The results of this analysis indicate that several variables place adolescents at risk for cannabis use. One socio-demographic variable and three stressors are found to increase the odds of cannabis use versus abstaining. Age emerges as the only significant demographic predictor of cannabis use. A positive relationship is observed indicating that the odds of using cannabis, in comparison to abstaining, are greater for older students. There are several explanations for this relationship. For example, the association between age and cannabis use may reflect a greater time “at risk” for cannabis use, or may suggest that older students have formed networks that facilitate the acquisition of cannabis. Further, three stress-related factors significantly influence the probability of cannabis use. Family relations, family structure and problems with school have significant, positive associations with cannabis use. Specifically,
poor family relationships, a non-intact family status and the experience of problems with school significantly increase the odds of cannabis use among adolescents.

Finally, informal social control is observed to have a significant main effect on the probability of cannabis use. As informal social control increases, this seems to directly reduce the odds of cannabis use among adolescents. The odds of cannabis use are substantially reduced for those students with high levels of informal social control in their lives. These results suggest that actions directed towards boosting or reinforcing informal social control mechanisms might act as effective intervention strategies, however, further investigation is necessary. The implications of these findings for policy and other initiatives will be discussed further in Chapter 8.

The hypothesis concerning the moderating influence of informal social control on cannabis use, however, was not supported by these analyses. Informal social control does not buffer the negative effects of any of the stressors examined in this study on cannabis use among adolescents. The stress process model suggests that psychosocial resources may condition the effects of stress on various health outcomes. This notion offers one explanation as to why not all individuals exposed to the same stressors experience the same outcome. In this thesis, I argue that the impact of stressors on the likelihood of cannabis use would be significantly attenuated for those adolescents with high levels of informal social control in their lives. Little research has focused on this role of informal social control and the results of this portion of my analyses suggest that this resource may not function in this capacity in the lives of young people with respect to their cannabis use.

This chapter described the results of a series of analyses that estimated the
relationships between family and school stressors and informal social control on the probability of cannabis use. I turn next to the question of whether the four stressors and informal social control predict different levels of cannabis use in the next chapter. In particular, I further our understanding of how various family and school stressors and informal social control influence the probability of problem cannabis use.
Chapter 5
Understanding Problem Cannabis Use among Adolescents

5.1. Introduction

The previous chapter presented the results of a series of bivariate and multivariate analyses that estimated the effects of family and school stressors and informal social control on the probability of any cannabis use. However, not all adolescents who use cannabis do so in the same amounts. One goal of this research therefore, is to examine the extent to which a combination of stressors and informal social control predict differential levels of cannabis use. This chapter completes the nested dichotomy examining the effects of stressors and informal social control within the user group. These models estimate the main and interaction effects predicting the probability of problem, in comparison to moderate, cannabis use.

First I present the descriptive statistics and bivariate correlations for the variables included in this model. Following this, logistic regression analysis is conducted to estimate the direct effects of the stressors and informal social control on the probability of problem cannabis use controlling for the other relevant socio-demographic factors. This analysis is followed by the estimation of the interaction models examining whether informal social control moderates the effects of the stressors on the probability of problem use.\textsuperscript{61}

\textsuperscript{60} Recall the nested dichotomy approach, as described in Chapter 3, constructs a set of dichotomies of successive binary partitions of the categories of the polychotomous variable. Following this, independent logit models are fitted to each dichotomy and logistic regression analyses are conducted.

\textsuperscript{61} With the exception of the fact these models estimate problem cannabis use, the models are identical in composition as those described in Chapter 4.
5.2. Descriptive statistics: User characteristics

The descriptive characteristics of the moderate and problem cannabis user groups are presented in Table 5.1. As illustrated, problem and moderate cannabis users are approximately the same age (16 years). About, 48 percent of the moderate users and 66 percent of the problem users are male. Both user groups report a mean socio-economic status of roughly 2.6.

The mean score on the scale of poor family relationships is 7.61 for the moderate users and 9.06 for the problem user group. The proportion of cannabis users who report a disrupted family status is 30 percent for those students who use cannabis at moderate levels and 42 percent for those who report problem use. Regarding the education stressors, the moderate users have a mean score on the measure of problems with school of 7.90 and problem users, on average, score 9.93 on the same measure. Perceptions of drug use as a problem in one’s school was reported by 84 percent of the moderate cannabis users and by 68 percent of the problem users. Finally, the average level of informal social control among the moderate users was 11.10 while the problem users indicated an average level of 6.89 on the scale. Recall that this scale ranges from 0 to 28 with higher values indicative of higher levels of informal social control. Therefore, on average, problem cannabis users report levels of informal social control in the lowest quartile of this measure.

5.3. Bivariate analysis

The bivariate correlations presented in Table 5.2 specify the associations between each of the variables and problem cannabis use. This table illustrates the effects of each of the
### Table 5.1
**Sample Characteristics for Moderate and Problem Cannabis Users**

<table>
<thead>
<tr>
<th>Sample Characteristic</th>
<th>Moderate Users N = 418</th>
<th>Problem User N = 158</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age*</td>
<td>15.98</td>
<td>16.13</td>
</tr>
<tr>
<td>Male</td>
<td>48%</td>
<td>66%</td>
</tr>
<tr>
<td>Socio-economic status* (1-5)</td>
<td>2.61</td>
<td>2.63</td>
</tr>
<tr>
<td>Poor family relationships* (0-17)</td>
<td>7.61</td>
<td>9.06</td>
</tr>
<tr>
<td>Disrupted family status (non-intact=1)</td>
<td>30%</td>
<td>42%</td>
</tr>
<tr>
<td>Problems in school* (0-21)</td>
<td>7.9</td>
<td>9.93</td>
</tr>
<tr>
<td>Drug use is a problem at school (problem=1)</td>
<td>84%</td>
<td>68%</td>
</tr>
<tr>
<td>Informal social control* (0-28)</td>
<td>11.1</td>
<td>6.89</td>
</tr>
</tbody>
</table>

*a* Values presented are means
<table>
<thead>
<tr>
<th>Variable</th>
<th>Zero-Order Correlation¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.014</td>
</tr>
<tr>
<td>Male</td>
<td>.137***</td>
</tr>
<tr>
<td>SES</td>
<td>-0.002</td>
</tr>
<tr>
<td>Poor family relationships</td>
<td>.196***</td>
</tr>
<tr>
<td>Disrupted family status</td>
<td>.111**</td>
</tr>
<tr>
<td>Problems with school</td>
<td>.249***</td>
</tr>
<tr>
<td>Drug use is a problem in school</td>
<td>-.172***</td>
</tr>
<tr>
<td>Informal social control</td>
<td>-.417***</td>
</tr>
</tbody>
</table>

¹ Correlations are based on Pearson r statistics

* p<.05  ** p<.01  *** p<.001
variables on problem cannabis use ignoring the effects of the other variables. This analysis indicates that gender is positively associated with problem cannabis use (i.e., boys are more likely than girls to report problem cannabis use). Neither age or socio-economic status are significantly associated with problem cannabis use.

The zero-order correlations also indicate that all four sources of stress have a significant relationship with problem cannabis use, three relationships in the expected direction. As anticipated, family relationships, family structure and problems in school have statistically significant and positive relationships with problem cannabis use. Therefore, among cannabis users, students who report poorer family relationships or a non-intact family status, or who experience greater problems at school, are more likely to be problem cannabis users.

Contrary to expectations, however, the bivariate analysis reveals a significant negative effect of perceptions of drug use as a problem in one's school and the probability of problem cannabis use. This implies that among cannabis users, students who perceive drug use to be a problem in their school are less likely to be problem users than those who do not hold these perceptions. This relationship is examined further in the multivariate analysis section.

Finally, informal social control has a significant and negative relationship with problem cannabis use. This suggests that among cannabis users, those who report higher levels of informal social control are less likely to be problem cannabis users than those with lower levels of informal social control.

Although these results provide some preliminary information about the bivariate relationships between the control and predictor variables and the outcome of problem
cannabis use, these findings examine the variables independent of the influence of the other variables. As such, these relationship are explored in greater detail in the following section by using multivariate analyses to examine the associations between stressors, informal social control and problem cannabis use, controlling for other factors that may determine levels of use.

5.4. Logistic regression: Multivariate analysis

The multivariate analyses were conducted using logistic regression to estimate the effects of each of the stressors and informal social control on the probability of problem cannabis use. The purpose of these analyses is to examine which variables place adolescents at greater risk for problem, as opposed to moderate, cannabis use. The main effects of the variables are presented first. This is followed by an examination of the interaction effects of informal social control. This latter portion of the analyses will evaluate whether the negative effects of the stressors on problem cannabis use are significantly attenuated for those adolescents who have high levels of informal social control. The results of these analyses are presented in Table 5.3.

Baseline Model

Model I in Table 5.3 presents the results of the logistic regression analysis when problem cannabis use is regressed on the three control variables. This model reveals that gender (b = .741, p<.001) is a statistically significant demographic control variable. That is, gender has a strong impact on the likelihood of problem cannabis use as the odds of problem
### Table 5.3
Logistic regression analysis of main and interaction effects models comparing moderate and problem cannabis users (N = 510)

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>.741***</td>
<td>.757***</td>
<td>.461*</td>
<td>.455*</td>
<td>.411*</td>
</tr>
<tr>
<td>Age</td>
<td>0.081</td>
<td>0.091</td>
<td>.172*</td>
<td>0.08</td>
<td>0.1</td>
</tr>
<tr>
<td>SES</td>
<td>0.073</td>
<td>-0.074</td>
<td>-0.13</td>
<td>-0.124</td>
<td>-0.126</td>
</tr>
<tr>
<td>Disrupted family status</td>
<td>.586***</td>
<td>.484</td>
<td>.45</td>
<td>-0.356</td>
<td></td>
</tr>
<tr>
<td>Poor family relationships</td>
<td>.134***</td>
<td>.089*</td>
<td>.079*</td>
<td>.051</td>
<td></td>
</tr>
<tr>
<td>Problems in school</td>
<td>.168***</td>
<td>.117**</td>
<td>0.097</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug use at school</td>
<td>-0.691</td>
<td>-0.351</td>
<td>.956*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal social control (ISC)</td>
<td></td>
<td>-0.212***</td>
<td>-0.201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disrupted family status*ISC</td>
<td></td>
<td></td>
<td></td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>Poor family relations*ISC</td>
<td></td>
<td></td>
<td></td>
<td>0.103</td>
<td></td>
</tr>
<tr>
<td>Problems in school*ISC</td>
<td></td>
<td></td>
<td></td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Drug use at school*ISC</td>
<td></td>
<td></td>
<td></td>
<td>-.168***</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-2.97</td>
<td>-4.05</td>
<td>-5.57</td>
<td>-1.92</td>
<td>-2.268</td>
</tr>
<tr>
<td>F</td>
<td>7.97**</td>
<td>15.07***</td>
<td>15.79***</td>
<td>13.72***</td>
<td>8.49*</td>
</tr>
<tr>
<td>(df)</td>
<td>(3)</td>
<td>(5)</td>
<td>(7)</td>
<td>(8)</td>
<td>(12)</td>
</tr>
</tbody>
</table>

* p<.05  ** p<.01  *** p<.001
use are 110 percent greater for males than females ($e^{.741} = 2.10$). Neither the student’s age ($b = .081; p = .116$) nor family financial situation ($b = .073; p = .515$) is a significant predictor of problem use.

**Effects of Stressors on the Probability of Problem Cannabis Use**

Models II and III incorporate the family and school stressors into the regression equation and estimate their direct effects on the probability of problem cannabis use. Some of the research that evaluates family structure and relationships suggests that the effects of family structure are accounted for by the effect of family relationships. This did not appear to be the case in regards to predicting any cannabis use (chapter 4). However, this effect may emerge when estimating the probability of problem cannabis use.

To examine this possibility further, the two family stressors (family relationships and family structure) are added to the baseline equation and the results are presented in Model II. These findings support the hypothesis that among cannabis users, the experience of familial strains will increase the probability of problem level use. There is a significant and positive effect of both family structure ($b = .586; p = .011$) and family relationships ($b = .134; p = .001$) on the probability of problem cannabis use. Specifically, the odds of problem cannabis use are 80 percent greater for those students who report a non-intact family status than those living with both natural parents and every unit increase in my scaled index of poor family relations increases the probability of problem cannabis use by 14 percent ($e^{.134} = 1.14$). These findings support previous research that identifies a significant relationship between the level of conflict, cohesion and stress in the family and level of cannabis use severity (Crundall, 1993;
Dishion and Loeber, 1983; Fergusson, Horwood and Lynskey, 1994; Kumpfer, 1987; Rhodes and Jason, 1990). Further, while some research suggests that family structure affects cannabis use primarily through its effect on attachment to parents (i.e., family relationships, see Laub and Sampson, 1988; Matsueda and Heimer, 1987), these analyses suggest that there is an independent effect of family composition on the probability of problem cannabis use.

Model III incorporates the two school stressors into the regression equation. When controlling for the demographic and family stressor variables, the results of this analysis provide partial support for the hypothesis that the experience of school-related stressors increases the likelihood of problem cannabis use among those students who are already using the drug. That is, experiencing problems with school (i.e., poor academic achievement; high truancy rates) increases the probability of problem cannabis use (b = .168; p < .001). This finding indicates that for every unit increase in my scaled index of school problems, the odds of being a problem cannabis user increase by 18 percent (e \( ^{0.168} \) = 1.18). Experiencing difficulties in school has been identified as a significant predictor of cannabis use in previous research (Allison and Dignam, 1990; Marcos and Bahr, 1995). These findings reinforce this conclusion and suggest a need to focus on this strain in the lives of adolescents as it may be a salient factor in the progression of cannabis use to problem levels.

In the bivariate analysis, perceived school drug use was significantly correlated with problem use. However, when the demographic controls and familial stressors are included in the model, this stressor does not have a statistically significant effect on the probability of problem cannabis use in the multivariate analyses (b = -.691; p = .164). It was hypothesized in Chapter 2 that perceptions of drug use as a problem in one’s school might reflect the extent
of the 'drug scene' at school and thus the student's level of exposure to drugs. This exposure, in turn, may increase the likelihood of cannabis use. The greater the perception of a drug problem in the school, I suggest, the greater the likelihood of intensive use occurring. This may be the case since students who hold these perceptions may be more familiar with, or even have established contacts with, other drug users and/or sellers in the school, thereby facilitating their access to cannabis.

However, constrained by the limitations of secondary data analysis, this variable is a proxy measure of school drug use and likely does not entirely capture this notion. Students already using cannabis at problem levels may be less likely to define drug use as a 'problem' in their school and more likely to see use as normative. Behavioural questions pertaining to witnessing drug use or exchange activities on or near school property and among school mates may provide a more accurate picture of school problem drug use, and should be incorporated into future research. In spite of this limitation, however, moderate cannabis users are more likely to report drug use as a problem in their school than are abstainers\(^{62}\). This finding does lend at least modest support to the notion of exposure being related to higher use levels.

Regarding the other variables in the model, family relationships remains a statistically significant predictor of problem cannabis use (b = .089, p = .020). However, family structure no longer has a significant effect on the probability of problem cannabis use (b = .484, p = .122). The debate regarding the effect of family structure on cannabis use suggests that a

\(^{62}\) The descriptive statistics indicate that 75 percent of the abstainers report drug use as problem in their school where as 84 percent of the moderate cannabis users hold the same perception.
disrupted family affects drug use due to its effect on family interactions (Farnworth, 1984; Hoffman, 1995; Laub and Sampson, 1988). Although further research is needed, the findings in this thesis suggest that a disrupted family status may influence the level of cannabis use through its effect on the experience of problems with school. That is, among cannabis users the effects of coming from a broken home may be experienced indirectly through problems with school. Thus, it is not the disrupted family status per se that increases the probability of problem cannabis use, but rather the effects this has on the adolescent’s school performance. Therefore, although there is no direct effect of family structure on the probability of problem cannabis use, there may be other intervening mechanisms, such as school experience, that influence this relationship.

The next section of this chapter presents a discussion of the results pertaining to the analyses evaluating the main and moderating effects of informal social control on the likelihood of problem cannabis use among those students who use the drug.

**Effects of Informal Social Control on the Probability of Problem Cannabis Use**

Model IV presents the main effects model estimating the results of the logistic regression analysis when informal social control is added to the equation. This model examines the prediction that even among those adolescents who use, informal social control influences their degree of cannabis use. The findings reveal that among cannabis users, informal social control does influence the level of cannabis use. When controlling for the

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63 The bivariate analysis reveals a positive and highly significant association between disrupted family status and experiencing problems with school ($r = .160; p < .000$).
demographic variables and the four stressors, a significant, negative association ($b = -.212$, $p < .001$) is observed between informal social control and problem cannabis use. Thus, among cannabis users, every unit increase in the amount of informal social control results in a 19 percent reduction in the odds of problem cannabis use ($e^{-0.212} = 0.81$). This result supports the hypothesis that among users, as informal social control increases the odds of problem use decline. Finding a strong direct effect of informal social control is important as it indicates that informal social control can be mobilized to deter cannabis users from progressing to problem levels of use. Informal social control may serve to regulate cannabis use among those adolescents who choose to use this drug. Therefore, while high levels of informal social control cannot guarantee abstinence among all adolescents, it may still serve to restrain the level of cannabis use.

Finally, although the magnitude of the effects decline when all of the variables are entered in the regression equation, gender, family relations and problems with school still have statistically significant effects on the probability of problem cannabis use. That is, among users, these variables are associated with a significant increase in the likelihood of problem cannabis use. These observations suggest that there are perhaps more potent effects of poor family relations and problems with school on cannabis use. The experience of these stressors, without resolution, may contribute further to feelings of alienation. As Calabrese (as reviewed in Spooner, 1999) noted, these feelings of alienation tend to reinforce alliances with other supportive subcultures that reject the norms of society and favour means of self-gratification, including drug use.

The results of the interaction model analyses are presented in the final column (V) of
Table 5.3. As illustrated, one significant interaction effect was found between informal social control and perceptions of drug use at one's school ($b = -.168; p < .001$). That is, informal social control moderates the effects of perceptions of problem drug use in school on the probability of problem cannabis use. This finding supports the hypothesis that the effects of perceiving drugs to be a problem at your school on the likelihood of problem cannabis use are significantly attenuated for those students with high levels of informal social control.

Given this significant interaction, the next step in this analysis is to specify the nature of the buffering effect of informal social control on perceptions of school level drug use. The results of this specification are displayed in Figure 5.1. The buffering effect of informal social control is evident when comparing students who perceive drug use to be a problem in their school and who also have low levels of informal social control to those students with high levels of informal social control. As seen in Figure 5.1, the ordinal interaction between informal social control and perceived school drug problems shows a stronger inverse relationship among those who perceive drug use to be a problem compared to those who do not hold this perception. For example, among those who perceive drugs to be a problem in their school, the proportion of adolescents reporting problem cannabis use declines from 34 percent among those with the lowest levels of informal social control to 5 percent among those with the highest informal social control. To this end, the effects of a student’s perceptions of school drug use are conditioned by high levels of informal social control.64

Regarding the other interaction terms, none are significant. Thus, the hypotheses that,

64 This conclusion assumes that the interaction term was not an anomaly. That is, that this moderating effect is in fact a ‘real’ finding and was not significant by chance. Further evaluation of this relationship would lend additional support to these conclusions.
among cannabis users, informal social control will condition the negative effects of these stressors and strains were not supported\textsuperscript{65}. Therefore, as was the case in the models estimating cannabis use (presented in Chapter 4), informal social control does not appear to operate as a moderator to the experience of stress and strain. While the direct effect of this variable remains very substantial even among cannabis users, the presence of strong informal social control does not alter the experience of stress in such a way as to reduce its negative impact on adolescents. This finding does not question the importance of informal social control; rather it suggests that alternative conceptualizations of how this resource operates are necessary. Unlike mastery and self-esteem, for example, informal social control may not be as internalized and offer the same protective, resiliency building effects. This notion needs further exploration. However, it should be noted that the measurement of informal social control used in these analyses is not standardized and alternative configurations of this variable may generate different results.

5.5. Summary of main research findings: Moderate versus problem cannabis use

One of the goals of this study was to expand our understanding of cannabis use, evaluating the predictors of different levels of cannabis use. This chapter has described the relationships between stressors, informal social control and the probability of problem cannabis use. The analysis of the main and interaction models generated several interesting

\textsuperscript{65} As with the interaction models estimated in Chapter 4, to evaluate whether the interaction effects were conditioned by other variables, three-way interaction models, incorporating gender and age respectively, were tested but none of the three-way interaction terms were significant.
Figure 5-1.

Interaction effect between perceptions of drug use at school and informal social control

drug use at school is not a problem

------ drug use at school is a problem
findings pertaining to problem cannabis use. First, two of the four stressors are observed to significantly predict problem cannabis use. Regarding the family stressors, family relationships have a significant positive association with problem cannabis use. Likewise, of the two school stressors, experiencing problems with school is positively and significantly associated with problem cannabis use. Therefore, for those students who use cannabis, the experience of poor family relationships and/or problems in school significantly increase the probability of problem cannabis use. Among users, neither family structure nor perceptions of drug use as a problem in one's school had direct effects on the probability of problem cannabis use. Finally, one significant interaction effect of informal social control was found: the effect of perceptions of drug use at one's school on the likelihood of problem cannabis use are significantly reduced for those adolescents with high levels of informal social control.

Second, regarding the influence of the demographic characteristics, gender emerged as the only significant predictor of problem use. A positive relationship was observed indicating that among those students who use cannabis, the odds of problem use are greater for boys than they are for girls. Neither age nor socio-economic status significantly influences the level of cannabis use for those already using the drug.

5.6. Predicting use versus problem use

To assume that the same stressors and strains predict both cannabis use and problem cannabis use may contribute to ineffective interventions. Indeed some research implies that the factors believed to predict current use are different from those that predict initiation or escalation to higher levels (Clayton, 1992; Esbensen and Elliott, 1994). The analyses
conducted in this chapter as well as in Chapter 4, have addressed this by considering two
general issues. First, the analyses evaluating the relationships between the stressors and
differential cannabis use address the following question. To what extent do family and school
stressors influence not only the probability of using versus abstaining from cannabis, but also
the probability of using cannabis at problem, in comparison to moderate, levels.

Second, this chapter has taken steps to evaluate the role of informal social control in
predicting differential cannabis use outcomes. The literature pertaining to the effects of
informal social control on cannabis use has generally discussed the direct effects of this
mechanism and focused on individual items rather than a composite measure. One of the
goals of the current study has been to expand this area of research and evaluate the more
complex, interactive relationships between informal social control, the stressors and cannabis
use outcomes. Therefore, in addition to evaluating the main effects of informal social control
on the two outcome variables, the results presented in this chapter also estimate whether
informal social control acts as a buffer to the negative effects of family and school stressors on
cannabis use.

The results of the multivariate logistic regression analysis presented in Chapters 4 and
5 reveal both similar and unique predictors that differentiate users from abstainers and
moderate from problem level users. A comparison of the significant predictors is presented in
Table 5.4. Considering first the demographic variables, age emerged as the only significant
predictor of cannabis use whereas gender significantly influenced problem cannabis use.
While age appears to be a key factor influencing the choice to use versus abstain, it is the
youth’s gender that seems to influence use patterns.
The probability of cannabis use is significantly greater for older students. That is, for every unit increase in age, the odds of cannabis use increased by 26 percent. However, age does not affect the level of use. While older students are more likely to use cannabis than younger adolescents, they are not more likely to use at problem levels. Age alone therefore does not increase the odds of problem use. This finding should be met with optimism. As an ascribed characteristic, age is not a variable amenable to intervention because we cannot stop people from aging. However we can address other factors, perhaps associated with age, that elevate the odds of problem cannabis use.

While gender does not significantly increase the odds of cannabis use in comparison to abstaining, among those students who use cannabis, the odds of problem cannabis use are greater for adolescent males than females. Indeed, males are 1.6 times as likely to use cannabis at problem levels than are females. Being male is thus associated with riskier patterns of cannabis use. This finding may reflect an overall propensity for risk behaviour in adolescent males in general, and if so, then motivation behind this type of behaviour should be examined in greater detail. Some literature also suggests that the progression to heavy or problem-level drug use reflects more of a psychological process, such as self-medication, in attempts to deal with stress and strain (Long and Scherl, 1984; Newcomb and Bentler, 1989). These results may therefore highlight a gendered response to the experience of stress: adolescent males may be more likely to self-medicate with illicit drugs than females.

The relationships between family and school stressors and differential cannabis use were also evaluated. The results of these analyses reveal a unique main effect of family structure on the probability of cannabis use. Specifically, students who report a non-intact
family status have a greater likelihood of using cannabis rather than abstaining. As illustrated in Table 5.4, the odds of cannabis use were 89 percent higher for those youth who came from a disrupted family background than for those from intact families. In these analyses then, the measure of "intactness" appears to influence the initial decision to use, but does not continue to significantly influence use patterns. While a non-intact family structure increases the probability of cannabis use, it does not elevate the risk of using at problem levels. It is important to note however that this variable captures only one aspect of what likely encompasses not only family disruption but also family composition. Therefore, although the findings of this thesis suggest that the stress associated with family disruption may not be so great as to contribute to problem use (in attempts to cope with the strain), or that the effects of a disrupted family structure are expressed through other factors such as family relations and problems with school, these conclusions are tentative at best.

Although this thesis incorporates four potential stressors in the analysis, this is not an exhaustive list. Incorporating additional items (that capture the spectrum of stressors, i.e., daily hassels) would provide additional information regarding the pathway(s) to drug use and problem drug use. However, the results presented in this chapter indicate that there are similar predictors of cannabis use and problem cannabis use. Poor family relationships and the experience of problems with school increase the likelihood of cannabis use and, among users, the likelihood of problem cannabis use. That is, for every unit of increase in the degree of poor family relationships the odds of cannabis use increased by 8 percent and the probability of problem cannabis use by 9 percent. Likewise, the odds of cannabis use increased by 7 percent for every increment in the adolescent's experience of academic problems, and among
### Table 5.4

**Significant Predictors of Cannabis Use versus No-use and Problem versus Moderate Use**

<table>
<thead>
<tr>
<th></th>
<th>Use vs. No-use</th>
<th></th>
<th>Problem vs. Moderate</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>odds ratio</td>
<td>b</td>
<td>odds ratio</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>.439*</td>
<td>1.55</td>
</tr>
<tr>
<td>Age</td>
<td>.231***</td>
<td>1.26</td>
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<td>SES</td>
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<td>Disrupted family status</td>
<td>.634*</td>
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<td>Poor family relationships</td>
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<td>1.08</td>
<td>.083**</td>
<td>1.09</td>
</tr>
<tr>
<td>Problems in school</td>
<td>.070**</td>
<td>1.07</td>
<td>.114**</td>
<td>1.12</td>
</tr>
<tr>
<td>Drug use at school</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal social control (ISC)</td>
<td>-.372***</td>
<td>0.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disrupted family status*ISC</td>
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<td></td>
</tr>
<tr>
<td>Poor family relations*ISC</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Problems in school*ISC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>-.183***</td>
<td>0.83</td>
</tr>
</tbody>
</table>

* p<.05  ** p<.01  *** p<.001
those who were already using cannabis, the odds of these youth using at problem levels increased by 12 percent as their experience of problems in this environment worsened. These stressors appear to have persistent or particularly potent effects on the likelihood of cannabis use among adolescents. Not only do these stressors influence the odds of using cannabis in comparison to abstaining, but they remain important predictors of the level of cannabis use involvement once the adolescent has started to use the drug.

As discussed earlier in this chapter, the significance of family structure did not diminish when family relationships were incorporated into the analysis. However, it did when school strains were considered. This may suggest an interesting avenue of further investigation. That is, to what degree do the effects of family structure express themselves through problems in school. The onset of the breakup of a family may contribute to the experience of problems in school, and among those already finding themselves in trouble at school, family disruptions may significantly exacerbate these problems. These issues remain to be examined.

A central goal of this research was to evaluate the role of informal social control regarding differential cannabis use. Informal social control is found to not only influence the choice to use rather than abstain from cannabis use, but also affects the degree of cannabis use involvement among those adolescents who use the drug. However, informal social control influences these outcomes in different ways.

The model predicting cannabis use versus abstaining reveals a negative main effect of informal social control on the probability of cannabis use. Therefore, as the level of informal social control the individual has increases, the odds of cannabis use are reduced. In other words, as informal social control increases, the more likely the adolescent is to abstain from
use. When considering the interaction effects, the analysis failed to find any significant moderating effects of informal social control on the stressors associated with cannabis use. Although this variable has a linear relationship with cannabis use, directly reducing the odds of students making the choice to use the drug, informal social control does not attenuate the effects of any of the stressors on the odds of using.

Conversely, the model predicting problem cannabis use reveals a significant interaction effect of informal social control. In this case, informal social control influences the degree of cannabis use involvement by moderating the effects of one of the stressors. Among cannabis users, the influence of a problem drug using environment on the odds of using cannabis at elevated levels is significantly attenuated for those adolescents with strong levels of informal social control. For those cannabis users who are in a "problem" school environment, it is possible that more informal social control may deter the progression to the next step of more intensive use. Although as mentioned previously, the power of this measure requires further testing, this finding does reinforce the notion that among cannabis users there are acceptable (or accepted) limits of use. While an awareness of these limits and concerns over the repercussions that are associated with deviating from them appear to mitigate the effects of this particular environmental stressor, these conclusion remain speculative.

There is another possible relationship that may exist between perceptions of school level drug use and informal social control. As previously discussed, while users in general may be less likely to report drug use as a problem in their schools, there is likely variation within this group. That is, users who already have high levels of informal social control may be more likely to perceive their schools as having a worse drug problem and, in turn, these
adolescents may have a greater awareness of the need to resist situations or individuals that may encourage heavier involvement in cannabis use.

Because this analysis focused on cannabis users, informal social control clearly did not prevent or deter this particular sub-set of adolescents from using cannabis in the first place. However, informal social control was found to temper the effects of student’s perceptions of drug use environment in their schools on the odds of increased cannabis involvement. Why the buffering impact of informal social control is observed for the user sub-group requires further investigation. However, it is possible that because of their drug use these individuals have experienced informal social control sanctions and thus have more substantially internalized this resource.

Constrained by the cross-sectional nature of these data, the temporal ordering of use, perceptions of the drug environment in one’s school and level of informal social control is not known. Therefore, these conclusions are speculative. However, although the impact of informal social control on the impact of different environmental contexts requires further examination, these results suggest that this type of control may moderate the effects of environmental stimuli.

5.7. Conclusion

One goal of this thesis has been to address the issue of why some adolescents progress to problem levels of cannabis use while others do not. This chapter has provided a discussion regarding the predictors of problem cannabis use and the role of informal social control in understanding this behaviour. More specifically, this chapter has examined whether and to
what extent family and school stressors and informal social control affect the likelihood of using cannabis at problem levels. In addition to estimating the models that predict problem cannabis use, then, this chapter also provides a comparative analysis of the factors that determine use and more problematic involvement with the drug. The results indicate that some of the stressors do have persistent effects and influence cannabis use and problem use; however, there are also a number of unique predictors. This chapter also provides an original analysis into the role of informal social control and differential cannabis use. Not only has this research established, to a point, a direct effect of informal social control on cannabis use, but the more complex, interactive processes are also evaluated.

Therefore, the analyses have concentrated on the effects of individual stressors on the likelihood of different levels of cannabis use. However, it is rare that an adolescent will experience only one stressor and, as such, it is necessary to estimate the impact of cumulative stress on the probability of cannabis use for young people. The following chapter presents the results of such an analysis.
Chapter 6

The Experience of Cumulative Stressors on the Probability of Cannabis Use

6.1. Introduction

“The extent of drug use is an increasing function of the number of diverse etiological variables instead of any particular set of them.” (Bry, McKeon and Pandina, 1982).

The previous chapters of this thesis have examined the influence of a variety of family and school stressors on the probability of cannabis use and different degrees of use. Using the stress process model, these analyses illustrate the extent to which the presence of individual stressors affect the likelihood of cannabis use and problem cannabis use among adolescents. However, it has long been recognized that there are numerous pathways into youth drug use that cannot be captured by a single etiological factor (Newcomb et al., 1987). This notion has subsequently led researchers to suggest that drug use is a general, rather than specific coping mechanism (Bry, McKeon, and Pandina, 1982). That is, the likelihood of drug use is dependent on how much, rather than what, there is to cope with. Therefore, not only is adolescent drug use a function of specific individual stressors, but it also is related to the cumulative number of stressors experienced. Furthermore, the number of stressors an adolescent must cope with may increase his/her level of drug use (Brook, Cohen, Whitehead and Gordon, 1992; Brown, 1989; Bry, 1983; Bry et al., 1982; Clayton, 1992; Dohrenwend, 1973; Farrell, 1993; Farrell, Anchors, Danish and Howard, 1992; Maddahaian, Newcomb, Bentler, 1988; Newcomb and Felix-Ortiz, 1992; Newcomb, Maddahaian and Bentler, 1986; Newcomb, Maddahaian, Skager and Bentler, 1987).
However, similar to literature that finds not all adolescents exposed to stress become drug users, not all adolescents who experience multiple stressors use drugs or use them at problem levels. Although the number of stressors experienced is directly related to the likelihood of drug abuse, "the additive effect may be buffered by the nature, context and number of protective factors present" (Clayton, 1992: 20). Therefore, in addition to estimating the effects of specific stressors and of informal social control on differential cannabis use, this thesis examines the relationship between the experience of cumulative stressors and the probability of cannabis use.

6.2. Preliminary analysis: Descriptive characteristics and bivariate analyses

In the first section, descriptive information regarding the characteristics of those adolescents who experience multiple stressors is presented66. This information is displayed in Table 6.1 and describes the background characteristics, a breakdown of the stressors that are most frequently reported and the distribution of informal social control for those adolescents reporting cumulative stressors. The number of stressors range from zero to four. In this sample, 10 percent (N = 190) of the youth reported no stressors, 41 percent indicate one, one quarter (26 percent) of the sample report two stressors and 11 percent report three or four67. Not all researchers examining multiple stressors (risk factor) models provide a breakdown of the distribution of the stressors. However, my findings are consistent with those studies that

66 The procedure used for constructing the measure of cumulative stress is described in detail in Chapter 3 (section 3.6). Recall that this measure ranges from 0 to 4 with 0 representing no stressors and 4 indicating the experience of all four stressors.

67 The reported percentages take missing data into consideration.
do report this information (Farrell, 1992; Newcomb and Felix-Ortix, 1992; Newcomb et al., 1986; 1987). Although based on different sample sizes, these studies find that the largest percentage of adolescents report either no risk factors or one risk factor⁶⁸ and in my analyses, 51 percent of the adolescents fall into this category.

As illustrated in Table 6.1, among those adolescents who report no stressors there is an equal proportion of males and females. For those reporting one or two stressors, 46 percent and 45 percent (respectively) are male and 54 percent and 55 percent are female. The proportion of males increases among those who report 3 or 4 stressors such that 53 percent and 56 percent of these groups are male. Regarding age, among those adolescents who report no stressors, the average age is 13 years and for those reporting 1 to 4 stressors the mean age is constant at 15 years. Finally, the average socio-economic status fluctuates as the number of stressors experienced increases. For those who report zero stressors, the average socio-economic status is 2.35 (this represents 'above average' socio-economic status) and among those with four stressors their average socio-economic status is 3.09 indicating an average family financial background⁶⁹.

Table 6.1 also presents the distribution of the specific stressors by the number of stressors reported. This analysis indicates which stressors adolescents are more likely to experience in relation to the number of stressors they report⁷⁰. As the table illustrates, among

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⁶⁸ The terminology 'risk factor' is used in this case to be consistent with that used in the actual research. Recall, the majority of studies examining adolescent drug use in the addiction field adopt the more epidemiological terminology.

⁶⁹ Recall that this measure of SES is coded such that higher numbers reflect lower levels of socio-economic status.

⁷⁰ This discussion only describes the distribution of the stressors for those reporting 1 to 3 stressors. No discussion is necessary for those individuals at the extremes (0 or 4).
Table 6.1.
Comparison of demographic characteristics, sources of stress and informal social control by the number of stressors reported (standard deviations in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>Number of Stressors reported</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (N=1980)</td>
</tr>
<tr>
<td></td>
<td>Male (%)</td>
</tr>
<tr>
<td></td>
<td>47.8</td>
</tr>
<tr>
<td></td>
<td>Age</td>
</tr>
<tr>
<td></td>
<td>(2.13)</td>
</tr>
<tr>
<td></td>
<td>SES</td>
</tr>
<tr>
<td></td>
<td>(0.89)</td>
</tr>
<tr>
<td>Poor family relationships (％)</td>
<td>24.7</td>
</tr>
<tr>
<td>Disrupted family (%)</td>
<td>25.8</td>
</tr>
<tr>
<td>Problems in school (%)</td>
<td>22.2</td>
</tr>
<tr>
<td>Drugs in school a problem (%)</td>
<td>76.6</td>
</tr>
<tr>
<td>Informal social control²</td>
<td>11.66 (6.58)</td>
</tr>
</tbody>
</table>

Supplementary notes:

a values presented are in means
b higher values reflect lower socio-economic backgrounds; 5 is indicative of well-below average family financial situations
1 numbers reflect the proportion of adolescents who fall in the top 20th percentile of the stressor
² these percentages represent the breakdown of the type of stressor reported.
those who report only one stressor, drug use as a problem in one's school is the most frequently cited (85.1 percent). Approximately 6 percent report a disrupted family, while a similar number report problems with their family relationships and problems in school. For those who report two stressors, drugs as a problem in school is again the most commonly experienced stressor. This is followed by the two family stressors, poor family relationships and disrupted family, and then problems in school. Finally, for those who experience three stressors, the most frequently reported stressors are drug use as a problem in school, poor family relationships, problems with school and disrupted family status.

Finally, Table 6.1 illustrates an inverse relationship between the number of stressors experienced and level of informal social control. The average level of informal social control drops consistently as the number of stressors experienced increases (see Clayton, 1992 for similar findings). For example, among those adolescents who report no stressors their average level of informal social control is 20.24. However, for those who report all four stressors, the average level of informal social control is 12.50. To the extent that informal social control insulates adolescents from the effects of stress, this finding suggests that those adolescents who need the most 'protecting' have fewer resources to draw from in their interpersonal relationships.

6.3. Number of stressors and the extent of cannabis use

In addition to presenting information regarding the background characteristics, a comparison of cannabis use patterns provides a preliminary examination of the relationships between the experience of cumulative stressors and differential cannabis use. A one-way
analysis of variance revealed a highly significant relationship between the number of stressors experienced and cannabis use as represented by the variable “cannabis involvement” (CANSTAT)\textsuperscript{71}, \(F (4, 1204) = 32.69, p<.000\).

Table 6.2 shows the relationship between the number of stressors experienced and the proportion of adolescents who do not use, use moderately or are problem cannabis users. As anticipated, as the number of stressors an adolescent experiences increases, so does the level of cannabis use. For example, among those adolescents who report no stressors, 11 percent are cannabis users. The proportion of cannabis users however, increases to 65.8 percent among those report all four stressors.

Further illustration of the relationship between cumulative stressors and the proportion of adolescents using cannabis is illustrated in Figure 6.1. This graph illustrates the percentage of adolescents who report cannabis use as the number of stressors increases. The proportion of cannabis users increases as the number of stressors increases. The largest change (18.6 percent) is evident when adolescents move from one to two stressors. After this point the proportion of cannabis users increases at a relatively steady rate (12.5 percent and 13.8 percent respectively). These findings support previous research that examines the relationship between multiple risk factors and cannabis use (Farrell, 1993; Farrell et al., 1992; Newcomb et al., 1986; Brook et al., 1992; Bry et al., 1982). In general, these studies conclude that

\textsuperscript{71} The variable CANSTAT is defined in Chapter 3 and represents the overall measure of cannabis use involvement in the adolescent student population. This variable was used to generate the nested dichotomies for the subsequent analyses throughout this thesis. The measure of cannabis involvement ranges from 1 to 3. Those given a value of 1 are the abstainers, 2 represents moderate cannabis users and 3 indicates problem cannabis users.
Table 6.2.
Comparison of drug use patterns by number of stressors experienced.
(Values are reported in percentages)

<table>
<thead>
<tr>
<th>Number of stressors</th>
<th>Abstainers (N=1360)</th>
<th>All Users (N=576)</th>
<th>Moderate use (N=418)</th>
<th>Problem use (N=158)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>89</td>
<td>11</td>
<td>88.3</td>
<td>11.7</td>
</tr>
<tr>
<td>1</td>
<td>79.1</td>
<td>20.9</td>
<td>78.8</td>
<td>21.2</td>
</tr>
<tr>
<td>2</td>
<td>60.5</td>
<td>39.5</td>
<td>75.4</td>
<td>24.6</td>
</tr>
<tr>
<td>3</td>
<td>48</td>
<td>52</td>
<td>66.1</td>
<td>33.9</td>
</tr>
<tr>
<td>4</td>
<td>34</td>
<td>65.8</td>
<td>48.3</td>
<td>51.7</td>
</tr>
</tbody>
</table>
Figure 6.1.

The effect of cumulative stressors on any cannabis use in comparison to abstaining.
those adolescents with a higher number of risk factors are more likely to use cannabis. These findings are evident in cross-sectional and longitudinal studies as well as those using different samples (i.e., rural versus urban; variety of age ranges) (Brook et al., 1992; Farrell, 1993).

An independent sample t-test revealed that the percentage of cannabis users among adolescents with one stressor is significantly higher than the percentage with no stressors ($p = .006$). Significant differences were also noted for those who report two versus one stressor and three versus two stressors ($p < .000$ and $p = .015$ respectively). The proportion of cannabis users among those with four stressors was not significantly greater than among those with three stressors ($p = .218$). Since few studies have estimated whether the increase in the proportion of cannabis users is associated with increases in the number of stressors experienced, there is little with which to compare these results. One exception is Bry et al. (1982) who examined a model with four risk factors. He found that significant increases in the proportion of cannabis users occurred only at the extreme ends of the risk factor continuum. That is, substance use involvement of those with one risk factor was greater than those with no risk factors and those with four were observed to be significant higher than those with three. In contrast, the results of my research find significant increases in the proportion of cannabis users up to three stressors, but not from three to four. This suggests that there may be a 'threshold' at which point the experience of additional stressors does not significantly affect the likelihood of cannabis use$^{72}$.

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$^{72}$ This is not to say that 3 or 4 stressors is "the" threshold point for all adolescents. Other studies using indices with more than four stressors document an increasing proportion of cannabis users as the number of stressors continue to escalate (see Farrell et al., 1992 for example). However, not all of these studies have conducted analyses to indicate whether these increases are significant.
The analysis was repeated for the user group to examine whether, among those adolescents already using cannabis, the experience of multiple stressors was associated with an increase in the proportion of problem cannabis use. The one-way analysis of variance test indicated a significant relationship between the number of stressors reported and problem cannabis use \((F(4, 346) = 2.77, p<.03)\) and a linear trend is also revealed in this analysis \((F(1, 346) = 9.733, p<.002)\). Among users, as the number of stressors increases, the proportion of adolescents who indicate problem cannabis use also increases. These findings support previous research that has examined the association between the experience of multiple risk factors and heavy cannabis use (Brook et al., 1992; Brown, 1989; Bry et al., 1982; Newcomb et al., 1986; Pandina and Schuele, 1983). My analysis demonstrates that just over half (51.7 percent) of the cannabis using adolescents who report four stressors also indicate problem use compared to 11.7 percent for those reporting no stressors (see Figure 6.2). The rate of increase in the proportion of problem cannabis users is more gradual than observed in the abstainer versus user comparison and the most substantial increase in proportion of problem cannabis users is between the experience of three and four stressors (17.8 percent). To evaluate whether the increase in the proportion of problem cannabis users was significant between the increments of stressors, independent t-tests were conducted. The results of this analysis show that these changes are not significant. That is, the proportion of adolescents who are using cannabis at problem levels among those with one stressor is not significantly greater than among those with no stressors \((p = .367)\). This finding persists when comparing
Figure 6.2.

The effect of cumulative stressors on the problem versus moderate cannabis use
adolescents who report two versus one stressors (p = .523), three versus two (p = .169) and four versus three stressors (p = .196). Therefore, although the proportion of problem cannabis users increases in a linear fashion with the experience of cumulative stressors, these increases are not significant.  

Informal social control

Throughout this thesis I have examined how informal social control influences cannabis use. The previous chapters examined the relationship between informal social control and each of the familial and school stressors, evaluating the direct and moderating effects of this resource on the probability of cannabis use and problem cannabis use. These results indicated a significant, direct relationship between informal social control and the likelihood of cannabis use and problem cannabis use, and one significant interaction was observed between informal social control and the perception of drug use as a problem in one's school. Thus, on the whole it appears that the effects of informal social control on reducing the odds of cannabis use are experienced primarily through its direct effects on cannabis use, not as a moderator to the specific effects of the individual stressors. Given the limitations and relatively untested application of my measure of informal social control, further evaluation of the potential moderating effects are required.

The findings presented in this chapter reveal trends in the expected direction suggesting a positive association between the number of stressors experienced and cannabis use.

73 Further exploration of the data (not shown on the table) indicated that the proportion of problem cannabis users among those with 4 stressors is significantly greater than among those who report either one (p = .009) or two (p = .024) stressors.
use. However, it should not be overlooked that 34.2 percent of those adolescents who report all four stressors in their lives abstain from cannabis use and, among cannabis users, 48.3 percent of adolescents with four stressors are using at moderate levels. Therefore, given that not all adolescents who experience multiple stressors use cannabis or use at problem levels, clearly something else is be operating in their lives that insulates these adolescents from the negative effects of cumulative stressors. I examine this possibility next.

Although these initial analyses suggest that the experience of multiple stressors will significantly increase the probability of any cannabis use and problem use and conversely, that informal social control will reduce the likelihood of these outcomes, multivariate analyses are necessary to isolate the independent effects of these variables by controlling for other potentially relevant demographic factors. The following analysis, therefore, estimates the direct effects of multiple stressors and informal social control on the probability of any cannabis use and problem use, as well as the potentially moderating effects of informal social control. It is hypothesized that informal social control will have a direct, negative effect on the probability of any cannabis use and problem use. That is, individuals with high levels of informal social control should be significantly less likely to either use cannabis or use at problem levels. Furthermore, I hypothesize that informal social control will buffer the effects of cumulative stressors on the likelihood of cannabis use and problem cannabis use. In other words, I expect that the effects of experiencing cumulative stressors on the probability of use and problem use will be significantly attenuated for those adolescents who have high levels of informal social control.
6.5. **Logistic regression: Cumulative stressors and the probability of cannabis use**

In the first series of models logistic regression is used to examine the effects of stressors and informal social control on cannabis use. The results are presented in Table 6.3. Model 1 in Table 6.3 illustrates the main effects of each of the independent variables on the likelihood of cannabis use. There is a positive and significant effect of age ($b = .150; p < .000$) indicating that for every unit increase in age the odds of cannabis use increases by a factor of 1.16. Neither gender or socio-economic status appears to have significant effects on the likelihood of cannabis use. This finding is consistent with the results presented in Chapter 4 that showed that gender and socio-economic status do not significantly influence adolescent cannabis use.

As anticipated, Model 1 also illustrates a positive and highly significant effect of cumulative stressors on the probability of cannabis use ($b = .395; p < .000$). This finding suggests that for each unit increase in the number of stressors experienced the probability of cannabis use increases by 48 percent ($e^{.395} = 1.48$). This finding supports the hypothesis that the experience of multiple stressors significantly increases the odds of cannabis use for adolescents.

The hypothesis that informal social control has a direct effect on reducing the likelihood of cannabis use is also supported. When controlling for the demographic variables and the number of stressors experienced, there is a significant, negative relationship between informal social control and cannabis use. For every unit increase in the level of informal social control, there is a 32 percent reduction in the odds of cannabis use ($e^{-.382} = 0.68$). Therefore, not only does informal social control have a direct effect when controlling for each of the
Table 6.3.
Logistic regression: Main effect and interaction model illustrating the effect of cumulative stress and informal social control on the probability of cannabis use and problem cannabis use

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cannabis Use</th>
<th>Problem Cannabis Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td>Male</td>
<td>0.139</td>
<td>0.123</td>
</tr>
<tr>
<td>Age</td>
<td>.150***</td>
<td>.146***</td>
</tr>
<tr>
<td>SES</td>
<td>0.093</td>
<td>0.094</td>
</tr>
<tr>
<td>Number of stressors</td>
<td>.395***</td>
<td>-0.116</td>
</tr>
<tr>
<td>Informal social control</td>
<td>-0.382***</td>
<td>-0.444***</td>
</tr>
<tr>
<td>Number of stressors x informal social control</td>
<td></td>
<td>0.038</td>
</tr>
<tr>
<td>Constant</td>
<td>1.5</td>
<td>2.4</td>
</tr>
<tr>
<td>F (df)</td>
<td>71.38</td>
<td>59.30</td>
</tr>
</tbody>
</table>

* p<.05   ** p<.01   *** p<.001
individual stressors (as described in Chapter 4), but this resource is also significant when taking into account the actual number of stressors experienced by adolescents. These results suggest that informal social control may play an important role in the onset of cannabis use among adolescents by directly decreasing the probability of use. Therefore programs and policies directed toward the prevention of adolescent cannabis use might fruitfully explore strategies developed to foster informal social control, and evaluate their impact.

Although these results suggest that higher levels of informal social control will directly reduce the likelihood of cannabis use among adolescents, the question remains as to whether this resource will also moderate the effects of cumulative stressors. That is, will the effects of experiencing multiple stressors on the probability of cannabis use be attenuated for those adolescents with high levels of informal social control? To examine this possibility, an interaction term (number of stressors*informal social control) was entered into the regression equation (Model 2); however, no statistically significant association was found (b = .038; p = .06)\textsuperscript{74}. High levels of informal social control therefore do not protect adolescents from the effects of cumulative stressors. As with previous findings in chapter 4, this suggests that informal social control does not seem to alter the way the adolescent experiences stressors and strains. It may be that informal social control is not internalized, or is not as much a part of an individual’s psychological make-up as are other resources. Thus, in the face of experiencing multiple stressors, the presence of strong informal social control does not mitigate these

\textsuperscript{74} This analysis was also run in SPSS and a statistically significant interaction term was found (p < .05). However, the graphical representation of this association suggests that it is not a very robust relationship. While the pattern of the interaction is in the expected direction the buffering effect of informal social control did not appear to be very substantial.
effects on the odds of cannabis use.

*The probability of problem cannabis use*

While cumulative stressors were observed to significantly increase the likelihood of any cannabis use, the question remains as to whether the experience of multiple stressors also influences the degree of cannabis use. I hypothesized that the odds of problem cannabis use would be significantly affected by the experience of multiple stressors. For example, if an adolescent already uses cannabis and is then confronted with a number of stressful situations, the degree of cannabis use may increase as a result of the adolescent’s need to cope with or escape the stress. Furthermore, given that the stressors examined in this thesis are related to two central institutions in a young person’s life - the family and school - the experience of cumulative stressors in these domains may intensify feelings of rebellion, of which drug use escalation may be one example. However, as suggested by the preliminary analysis presented in Table 6.2, among those using cannabis, a sizeable proportion of adolescents who experience multiple stressors are not using at problem levels. This suggests that some individuals find alternative means of coping with stress or, that the effects of multiple stressors are being conditioned by the presence of high levels of informal social control.

To address these issues, a second logistic regression was run estimating the effects of these variables on the probability of problem cannabis use. These findings are also presented in Table 6.3. The first model reveals the direct effects of each of the variables on the likelihood of problem cannabis use. Gender is the only significant demographic factor predicting problem use ($b = .476; p < .05$) and indicates that the odds of problem use are 60
percent greater for males than females ($e^{.76} = 1.60$). Again these findings support the analysis presented in Chapter 5.

As anticipated, there is a significant and positive relationship between the number of stressors experienced and the probability of problem cannabis use ($b = .426; p < .001$). This result indicates that for every unit increase in the number of stressors experienced, the odds of problem cannabis use increase by 53 percent ($e^{.426} = 1.53$). Therefore problem cannabis use is clearly not only a function of specific stressors and strains (see Chapter 5), but is also related to the cumulated number of stressors to which an adolescent is exposed.

The direct effects of informal social control are also illustrated in these findings. A significant, negative association between informal social control and problem cannabis use is presented in Model 1 ($b = -.261; p < .000$). In fact, for every unit increase in the measure of informal social control, the probability of problem cannabis use decreases by 23 percent. Therefore, even among those who are using cannabis, the likelihood of this use progressing to problem levels is reduced as one's level of informal social control increases. Again these findings echo those presented in Chapter 5 that estimated the main effect models with each of the four individual stressors, and reinforce the strength and importance of informal social control in reducing the likelihood of cannabis use.

Again, to test whether informal social control also moderates the effects of cumulative stressors on problem cannabis use, an interaction term was added to the regression equation. The results of this analysis are presented in Model 2 in Table 6.3 and indicate that informal social control does not act as a buffer to the effects of cumulative stressors on problem cannabis use ($b = .023; p = .523$). Among cannabis users, reporting multiple stressors
increases the probability of problem level use. This effect is not mitigated by the presence of strong informal social control in the adolescent's life. However, although informal social control does not moderate the harmful effects of cumulative stress, this resource still offers protection to adolescent cannabis users. The influence of this variable is experienced directly as those with strong levels of informal social control are in general less likely to use cannabis at problem levels. Therefore, although still speculative, programs that emphasize strengthening informal social control should not be restricted to the goal of achieving or maintaining abstinence. Those adolescents who have already made the choice to use cannabis may benefit from programs that assist in the prevention of cannabis use escalation.

6.6. Summary

Several factors have been identified as influencing adolescent drug use (see Hawkins et al., 1986; Newcomb and Bentler, 1989 for examples). However, many different opinions exist as to which are the more salient predictors of drug use. These differences have been attributed to a variety of factors including methodological differences (Chassin, 1984) and the failure to consider stages of drug use (Kandel, 1980). Another possible explanation (Bry et al., 1982) however, is that these discrepancies suggest that no one definitive cause for drug use exists; rather, there are multiple pathways through which adolescents initiate or escalate their involvement in drug use.

The focus of this chapter has been to evaluate the proposition that drug use is a function of the total number of stressors present for a given individual. Specifically, I estimate whether the likelihood of cannabis use is associated with the number of stressors to which an
adolescent is exposed. This type of analysis has been conducted examining other 'problem behaviours' such as depression, mental illness and heart disease (see Bry et al., 1982 for examples) and finds a definite association.

The analyses in this chapter were conducted in two stages. First I estimated the effects of cumulative stressors on the probability of cannabis use and tested the hypothesis that among adolescents, the odds of using cannabis increase as the number of stressors the individual is exposed to increases. This was followed by an analysis of those adolescents already using cannabis and estimated the effects of multiple stressors on the probability of problem cannabis use. The direct and moderating effects of informal social control were included in both of these analyses. This portion of the analysis tested the hypotheses that the effects of cumulative stressors on the likelihood of cannabis use (and problem cannabis use) will be attenuated for those adolescents with high levels of informal social control.

The results of these analyses replicate previous research that shows adolescent cannabis involvement to be associated with the number of stressors to which the youth is exposed. In both the analysis predicting use and problem use, as the number of stressors experienced increased so too did the probability of cannabis use. The exposure to cumulative stressors, however, does seem to have a stronger impact on the odds of problem use than use in general. That is, for every unit increase in the number of stressors experienced, the probability of problem cannabis use increases by 53 percent in comparison to a 48 percent increase for cannabis use. Furthermore, these findings also suggest that there may be a threshold point at which the experience of additional stressors does not significantly influence cannabis use involvement. The proportion of cannabis users did not significantly differ
between those adolescents reporting four in comparison to three stressors. This notion needs further examination as my research included only four stressors and other work in this area using a greater number of stressors finds continued increases in the proportion of adolescent cannabis users as the number of stressors increases

The role of informal social control on cannabis involvement was also estimated in this chapter. Reinforcing the results presented in Chapters four and five, a substantial direct influence of this variable was observed in both the model predicting use and problem cannabis use. That is, informal social control significantly reduces the likelihood of cannabis use involvement. This resource appears to have a greater impact on reducing the odds of cannabis use than the odds of problem cannabis use as for every increase in the level of informal social control the likelihood of cannabis use decreases by 32 percent whereas the odds of problem cannabis use are reduced by 23 percent. Overall, however, these findings strengthen the position that informal social control has a very strong influence on adolescents and the choices they make regarding cannabis use. Not only does informal social control reduce the odds of initiating cannabis use but it also decreases the probability of use escalating to problem levels.

The moderating effect of informal social control was also evaluated in this series of analyses and it appears that this resource operates primarily as a direct effect on cannabis use. The models estimating the buffering effects of informal social control on the experience of cumulative stress were non-significant. Thus, the effect of multiple stressors on the probability of cannabis use are not significantly reduced for those youth with high levels of

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75 For example, Farrell et al (1992) examining the impact on rural grade seven students of exposure to seven stressors finds that of those who report seven stressors 80 percent are cannabis users.
informal social control. Since not all adolescents who are exposed to cumulative stressors either use cannabis or use at problem levels, these findings suggest that other resources serve to insulate youth from these negative influences.

In general then, these findings support what has been termed a 'coping model' (Bry et al., 1992) which posits that youthful drug involvement escalates as the number of stressors adolescents must cope with in their lives increases. Understanding the impact of individual stressors as they influence different levels, or stages, of cannabis use remains an important research objective. However, the results of my analysis illustrate the need to conceive of each factor as one in a possible constellation of stressors that are associated with increased cannabis involvement.

The following chapter provides a review of the major findings of this research and their implications. In doing so I discuss both the predictors of differential cannabis use as well as the role of informal social control in regulating this behaviour. The limitations of my research as well as future research objectives are also presented. Finally I conclude with a discussion of how these results may inform policy and program initiatives directed toward the intervention and prevention of adolescent cannabis use.
Chapter 7

Summary and Discussion

7.1. Introduction

The successful negotiation of adolescence has significant implications for future life course experiences. Given the importance of adolescence as a life stage, any disruptions during this time may have significant implications across the life course. The potential health and legal consequences of cannabis use pose such threats to both the physical and social well-being of adolescents. That is, engaging in deviant behaviours, including cannabis use, may contribute to the experience of either premature or disorderly transitions that leave adolescents ill-prepared for their adult roles (Hagan and Wheaton, 1993).

Understanding why adolescents engage in potentially health compromising and stigmatizing behaviours is an important question for scholars and those concerned with improving the welfare of youth. Many theories have been put forth as to why adolescents use drugs; however I have argued in this thesis that further insight into the processes associated with adolescent drug use can be gained from applying a framework that examines cannabis use as it is related to the experience of stress.

The relationship between adult substance use, especially alcohol use, and stress has been well-documented. However, most contemporary theories ignore the role of stressors as they influence drug use by adolescents. Indeed, explanations of adolescent cannabis use focus primarily on family interaction, social control and social learning theories of adolescent behaviour (Petraitis et al., 1995). While these theories have contributed to the understanding
of adolescent drug use, the role of the adolescent’s mental health as it influences the pathways
to drug use has been largely neglected in the sociological literature. The stress process model
addresses this limitation and provides an innovative framework to examine the relationship
between the experience of stressors and cannabis use.

Until recently, the application of explanatory frameworks that involve the notion of
stress, particularly among adolescents, have been absent (see Allison et al., 1997; Hoffman,
1993, 1999 for exceptions). Adolescence is a time of rapid change and growth and these
developments are often associated with stressful experiences. Indeed, middle adolescence (15
- 16 years of age) is the time of life at which the highest number of stressful life events occur
(Newcomb, Huba and Bentler, 1986). It is also the stage of cannabis use escalation. Given
the overlap in the timing of these two experiences, it is reasonable to explore the possibility
that there is a relationship between them. Understanding these connections may further our
knowledge of the causal processes that underlie adolescent cannabis use.

Two central research themes guided this thesis. First, do family or school stressors
influence cannabis use among adolescents? Cannabis use unfolds along a continuum and while
any amount of cannabis use constitutes some risk, adverse health and legal consequences are
most salient for those adolescents using cannabis at the more frequent end of the continuum.
Therefore, in addition to developing models that estimate a particular pathway to cannabis
use, this thesis also examined the relationship between the experience of stressors and problem
cannabis use. In addition to assessing the relationship between social stressors and adolescent
cannabis use, the experience of cumulative stress was also estimated. While individual
stressors have been linked to substance use, little research has examined them in combination.
That is, experiencing a number of stressors may result in an accumulation of burden that increases the likelihood of cannabis use. Thus, the effects of individual stressors, as well as the impact of cumulative stress on the probability of cannabis use were examined.

In addition to estimating possible pathways that lead to adolescent cannabis use, it is equally important to examine why some adolescents either abstain from use or maintain their use at 'experimental' or non-problematic levels. Based on this issue, the second major research question asked was: what role does informal social control play as a resource that may influence different levels of cannabis use among adolescents? Thus, a further intent of this thesis was to evaluate the relatively untested role of informal social control as a potential moderator to the effects of stress and strain. Policies designed to regulate drug use often fall either directly or indirectly under the supervision of formal control initiatives and agencies (i.e., sanctions for possession; controls on availability; police). However, there are a number of aspects along the pathway to adolescent drug use that are not associated with elements of formal control. That is, processes and initiatives reflecting informal social control mechanisms may be as, or more effective in limiting cannabis use among teens. Therefore, similar to mental health researchers and psychologists (see Cohen and Wills, 1985; Wills, 1986; Wills and Shiffman, 1985 for examples) who study stress-buffering effects, I hypothesized that the effects of stressors and cumulative stress on the probability of cannabis use would be conditioned by informal social control.

This chapter provides a brief review of the major findings from my research. In doing so, the utility of the stress process model as a framework for understanding adolescent cannabis use is presented and the implications of these results are also discussed.
7.2. Major research findings and the utility of the stress process model

This analyses presented in this thesis were based on data from 1,980 adolescents in the province of Ontario, specifically, those students in grades seven, nine, eleven and thirteen who were currently attending school when the Ontario Student Drug Use Survey was administered in 1997. The average age of the adolescents in this sample was 15 and there was a relatively equal distribution of males (48 percent) and females (52 percent).

My dependent variable, cannabis use, was defined on the basis of three criteria: frequency of use, quantity of use and self-reported problems with cannabis use. From this measure, three levels of use were then operationalized: abstainers, moderate users and problem users. Approximately 69 percent of the sample were abstainers and 29 percent were cannabis users. Further, among those adolescents using cannabis, 73 percent were using at moderate levels and 27 percent were classified as problem users.

Logistic regression analyses were conducted evaluating a series of models that estimated the effects of family stressors, school stressors and informal social control on the likelihood of cannabis use and problem cannabis use. Several key findings emerged from these analyses. The first set of results focused on the demographic predictors of cannabis use and illustrated the differential impact of age and gender on the level of cannabis use. A significant positive relationship between age and the likelihood of cannabis use found that as adolescents age the likelihood of cannabis use increases. This relationship was not unexpected as older adolescents have a greater exposure time to potential networks of other cannabis users than do younger adolescents. Older teenagers are therefore more likely to have access to cannabis, as well as to other youth who can teach them how to use (Becker, 1963).

However, age was not significantly associated with problem cannabis use. Among those youth using cannabis, older adolescents were no more likely to use cannabis at problem levels than were younger ones. If older adolescents have a more prolonged exposure to cannabis and user networks it is reasonable to assume that they might also gradually escalate use of cannabis to problem levels. Nevertheless this was not the case in these analyses. Age per se was not significantly associated with problem cannabis use. Therefore, while exposure associated with age may increase the odds of cannabis use, other variables identified in this thesis appear to propel adolescents to use at problem levels. There are, however, other aspects of being older, greater mobility, more autonomy and less supervision, for example - that might be contributing factors to cannabis use. These should be evaluated in subsequent research.

The stress process model provides some insight into the role of age and adolescent cannabis use and why there may be no association between age and problem cannabis use among adolescents in this sample. Middle adolescence is typically regarded as a highly stressful stage of the life course (Hoffman and Cerbone, 1999). Therefore, following the principles outlined in the stress process model, if older adolescents have fewer stressors to cope with they will be less likely to turn to cannabis use, or intensify their use, as a coping mechanism. In addition, older adolescents, over time, learn more effective coping strategies and may have developed a greater sense of independence and the power to remove themselves from stressful environments. Moreover, as youth mature they become less self-directed in

\[76\] Whether older adolescents in general do experience fewer stressors remains to be empirically evaluated. Their exposure to certain types of stressors (i.e. decisions regarding future roles or academic pressure to be admitted to university) may in fact intensify.
their thinking and therefore no longer magnify the experience of stressors (Aldwin, Sutton and Lachman, 1996). Therefore, this group may also be better able than younger teens to deal with stressors when they arise.

In contrast to age, gender had no significant effect on the likelihood of cannabis use (versus abstaining), but did distinguish problem use from moderate cannabis use. While males were no more likely to use cannabis than females, once an adolescent started to use cannabis, males were roughly one and a half times more likely than females to progress to problem use. Research suggests that males are more likely than females to use cannabis in public places (Warner, Weber and Alabnes, 1999). This puts males at a greater risk for detection by authorities and subsequent prosecution. Indeed, as Erickson (1980) showed, there is a 9:1 arrest ratio of males to females among those appearing in court for cannabis possession offence. Further, because males still “control” cannabis distribution (Warner et al., 1999), they are in turn much more likely to be arrested for dealing activities which garner more severe punishments. Further, since drug markets are inherently violent, young males involved in these networks may be exposed to an elevated risk for experiencing serious physical harm and injury. Finally, by nature of their control over cannabis distribution, males also have easier access to cannabis, and this may contribute to their elevated patterns of use. Thus, in addition to the risks associated with the illegality of cannabis, males may also experience a greater risk of negative health consequences associated with heavy and prolonged use of the drug.

The mechanisms that contribute to this gender difference, however, are less clear. It is not known whether the same factors explain drug use among both males and females. The
stress process model offers some insight into this gender relationship. For instance, if males experience a greater number of stressors than females, this may contribute to an increased likelihood of cannabis use among males. However, it is also possible that male and female adolescents may be exposed to different types of stressors, whereby some are more strongly associated with an elevated probability of cannabis use. Therefore some of the gender differences in cannabis use may be explained by gender differences in exposure to stressors.

While these possibilities may explain the gender difference in problematic cannabis use, I suggest that it is the experience of stressors coupled with alternative means of coping that is more likely to contribute to this difference. That is, given the difference in gender socialization (Pearlin, 1989; Smith and Paternoster, 1987) males may be less likely to turn to others for help in managing their stress and instead mask these feelings with substance use. This relationship is apparent in studies of adults that reveal a significant association between stressors and substance use in males and the experience of stressors and depression in females (Nolen-Hoeksema, 1987). Males may therefore be somewhat more vulnerable to the effects of stress as they have potentially fewer, or different, interpersonal coping mechanisms available to them. Moreover, historically, labels of deviance have been attached to women who reject the traditional role of upholding the moral values of society and participating in behaviours presumably reserved for men (of which substance use, particularly use to excess, is one) (Warner et al., 1999). Therefore, adolescent females may be less likely to use cannabis for coping, not only because their access is male-controlled, but also because they may be more inclined to avoid the further strain of acquiring a deviant label, and prefer to seek alternative means of coping with stress.
Research applying the stress process concepts of exposure versus vulnerability, along with the consideration of the norms associated with gender roles will further the understanding of this persistent difference noted in cannabis use. Indeed, the stress process model recognizes that events do not occur in a vacuum, but rather are conditioned by the social environment. Thus, this model provides a useful framework for further assessing the gender difference in cannabis use among adolescents.

**Stressors**

The central goal of this thesis was to apply a stress process formulation to the study of cannabis use among adolescents. The particular pathway I examined estimated how the experience of stress translated into different levels of cannabis use among adolescents. Adolescence is marked by an increase in both the actual number of potentially stressful experiences as well as an elevated perception of stress (Compass et al., 1993; Hoffman and Cerbone, 1999; Hoffman et al., 1992). In this thesis I estimated the effects of stressors that may potentially arise within two central life domains: the family and the school. A series of logistic regression analyses were conducted, controlling for demographic variables to evaluate the extent to which these stressors influenced the likelihood of cannabis use and problem cannabis use. Based on the results of these analyses that applied and tested a portion of the stress process model, what can be concluded as to the utility of the stress process model in advancing the understanding of differential cannabis use among adolescents?

The core of the stress process model revolves around the notion that the experience of stressors and strains disrupts an individual's sense of balance and produces elevated levels of
distress that, in turn, require some change and re-adjustment on the part of the individual in order to restore balance. Another crucial component of this model is that negative effects on health are reduced by the presence of resources in an individual’s life that moderate the effects of these stressors. Within the field of mental health, research has examined how the experience of these stressors is associated with outcomes of psychological distress (see Aneshensel, 1992; Monroe, 1992, for excellent reviews). While some work in this area has examined alcohol abuse among adults, less attention has been given to the application of a stress process model to adolescent cannabis use. In this thesis I adopted these principles and used the stress process model as an alternative approach to the study of adolescent cannabis use.

The stress process model describes the presence of different types of stressors in the lives of individuals; acute and chronic stressors are two such types. The key distinction between these types of stressors is the time course of the stressor. Acute, or event stressors, are generally more recent experiences that require some readjustment or behavioural change. These include such things as having a baby, getting married, being fired or getting divorced. Chronic strains are more open-ended and are the most consistently continuous forms of stress (Wheaton, 1994). Some examples of these ongoing difficulties include long-term unemployment, prolonged illness and problems in roles and relationships (Brown and Harris, 1978). Thus, acute stressors are relatively short lived while chronic stressors are much more persistent in nature. Acute stressors may be more likely to contribute to the initial use of cannabis while chronic stressors may be more likely to be associated with problem cannabis use. That is, the more persistent the strain in the life of an adolescent, the more likely it is that
their cannabis use may escalate to cope with the strain.

Consistent with the rationale guiding the stress process model, the results of this thesis suggest that the type of stressor, as well as the number of stressors experienced, are associated with an elevated risk of cannabis use and problem cannabis use among adolescents. One aspect of this thesis was to identify whether the stressors that predicted cannabis use also predicted problem levels of cannabis use among adolescents. The results of these analyses are mixed and suggest a need to differentiate the role of acute stress from chronic stress on adolescent cannabis use.

**The Family**

A substantial amount of research has been directed towards investigating the influence of familial factors on adolescent deviance. As related to the stress process model, one area of life in which stress may arise is the family. The family, within which the early socialization and control of adolescents takes place frequently provides a starting point for research on adolescent drug use (Hoffman, 1995). Two key aspects of the family are generally examined in studies of adolescents: family structure and family relations. Family structure refers to whether the adolescent comes from an intact family with both parents still together or whether their family has, in some way, been disrupted (i.e., through divorce, death). Family relations on the other hand, refers to the degree of cohesion and support within the family (i.e., the quality of the relationships, degree of problems, arguments and parental pressures).

Family structure has been linked with many social phenomena such as teenage pregnancy, delinquency and drug use (see Hoffman, 1995). My analyses provided some
clarification as to the role of the family by examining whether and how family structure influenced the likelihood of use and different levels of cannabis use. The results indicated that coming from a disrupted family background significantly increased the odds of cannabis use among adolescents. This finding was not unexpected as there is considerable evidence suggesting that the disruption of the family unit increases the risk for substance use (see Flewelling and Bauman, 1990; Foxcroft and Lowe, 1991; Hoffman, 1993 for examples).

However, the extent to which a disrupted family structure is associated with problem cannabis use has been less frequently examined. A separate analysis focusing only on the adolescents in this sample who were using cannabis provided the opportunity to examine this issue. The results of the models predicting problem cannabis use, however, indicated that once the adolescent started to use, this stressor did not affect their level of cannabis use. Although it is possible that some youth will progress more rapidly to elevated levels of cannabis consumption, this process generally evolves over time. Therefore, while family disruption has a substantial impact on the likelihood that adolescents will use cannabis, the impact of this stressor does not appear to have persistent (or more chronic) effects in elevating the probability of problem use.

While it would be premature to conclude that the results of these analyses determine whether the stressors I have examined are acute or chronic, they do perhaps suggest something about the nature of the persistence of each of the stress mechanism. Therefore, because family structure was not observed to significantly affect the odds of problem cannabis use, the effects of this stressor may be considered more acute in nature. However, as a cautionary note these analyses examined only one outcome variable and there may be other
aspects of family stressors that are not measured in this thesis.

Although family structure has received considerable research attention regarding adolescent cannabis use, another element of the family domain that may also influence this behaviour is poor family relationships. Indeed, a tension exists in the literature as to the exact nature of the relationships between family structure and adolescent cannabis use (Dryfoos, 1990; Fergusson et al., 1994; Resnick, Harris and Blum, 1993). Not all research finds that family structure is, in fact, directly associated with cannabis use among youth. Instead, there is a counter argument that suggests that family relationships may be a more important predictor of adolescent cannabis use, further insinuating that the effect of family structure may have been overstated. Instead, some researchers have found that when the effects of family relationships are considered in a model predicting cannabis use, the impact of family structure is reduced, often to non-significant levels (Adlaf and Ivis, 1996).

Family relationships encompass a range of factors, including family bonding, affection, and monitoring, that influence the successful socialization of youth. Poor family relationships, characterized by interpersonal hostility, minimal supervision and little time spent with family create an environment in which adolescents may experience substantial stress. I hypothesized that to compensate for these feelings adolescents may turn to cannabis use. Furthermore, as family relations tend to erode gradually, this prolonged experience may constitute a chronic strain in the lives of adolescents. And, indeed, it does appear that poor family relationships may operate in this manner. Not only do the results of these analyses indicate that strained familial relationships differentiate users from abstainers, but among users, this strain significantly increases the odds of problem use. This finding implies a more persistent effect
of this stressor. This relationship has been observed in other studies that find one of the primary influences on drug use severity to be a poor family environment (see Hoffman, 1995; Rhodes and Jason, 1995). That is, the level of cohesion, conflict and stress in an adolescent’s family is significantly associated with levels of substance use (Crundall, 1993; Dishion and Loeber, 1983; Kumpfer, 1987).

The focus of this thesis was to examine the processes that underlie adolescent cannabis use within a stress process model framework. That is, by incorporating principles of other theories, such as social control, within a stress process framework I argued that it may be possible to add another layer of explanation to this behaviour. The association between poor family relationships and adolescent cannabis use reflects the social bonding concepts described in the general theory of social control (Gottfredson and Hirschi, 1990; Hagan, 1989; Hirschi, 1969). However, I suggest here that the stress process model enhances or complements this theory in that it offers an additional layer to the explanation of why low attachment contributes to cannabis use. There are at least two possible ways in which poor family relations contribute to adolescent cannabis use. First, the process of the erosion of family relationships, growing lack of familial cohesion and the deterioration of family bonds creates an environment filled with stress and strain with which the adolescent must cope. Some youth may cope with this stress by becoming involved in more expressive delinquent acts while others may turn to drug use. Second, with the weakening of family relationships, parental supervision is often also compromised and control may therefore decline. Thus, in addition to creating the stress and perhaps the desire to rebel against their parents, the associated decreased supervision also provides the opportunity for adolescents to use cannabis.
Moreover, should this situation persist, the level of cannabis use is also likely to escalate. At this point, escalation of use may reflect less rebellion against one's parents and more a process of self medication in attempts to cope with the persistent strain of deteriorating family relationships.

Family structure and family relations are not necessarily mutually exclusive aspects of the family domain. That is, the experience of family disruption may threaten or contribute to the deterioration of family relationships and this deterioration in turn affects the likelihood of adolescent cannabis use. However, the results presented here do not find evidence of this relationship. The set of analyses that estimated the effects of the family stressors indicated that both family variables had a highly significant impact on adolescent cannabis use and problem cannabis use. However, there is some suggestion in these findings that the effects of family stressors are also expressed through their affect on the adolescent's academic life. In both series of analyses, and particularly for those predicting problem cannabis use, the strength and significance of the family stressors were reduced by the presence of the school stressors. Among those adolescents who were currently using cannabis, disrupted family status became non-significant when the school stressors (particularly experiencing problems in school) were included in the model. That is, when the school stressors were added to the model predicting cannabis use there was a noticeable reduction in the strength of both family stressors, as well as a slight decrease in the significance level of family structure. Likewise, in the model predicting problem cannabis use a larger reduction in strength and in the significance of poor family relations was noted and the effect of disrupted family structure was
reduced to non-significant levels. These findings suggest, not surprisingly, that the family and school domains of an adolescent's life are not independent of one another. Rather, the effects of familial instability, whether it pertains to the family's structure or relations, may influence cannabis use through its effect on school performance. Although not the focus of this thesis, these more complex interconnections between stressors require further evaluation in future research.

The findings pertaining to the impact of family structure on cannabis use are limited. A better operationalization of the family structure variable is required to more fully appreciate and understand the influence of this stressor. In these analyses, family structure was defined as a dichotomy and, thus did not take into account the way in which the family was disrupted. This kind of additional information adds an element of context to this stressor and allows researchers to estimate the effects of specific types of disrupted family stressors and how these may be experienced by different subgroups of the adolescent population. For instance, some research has found that divorce leads to increased drug use for males, while re-marriage predicted higher drug use among females (Needle et al., 1990). Thus, a more detailed measure of family structure may provide a better understanding of the nature of the effects of this aspect of the family domain.

The stress process model may also provide additional guidance in this endeavour. Stress, as discussed by Pearlin (1989), occurs in a larger social context. It is this context that may determine, or contribute to, the extent to which the experience of family disruption is perceived as stressful. For example, for an adolescent with a family life characterized by

77 These findings are presented in Chapters 4 and 5 on Tables 4.3 and 5.3 respectively.
persistent fighting and tension between parents, the experience of a divorce may be not a stressor, but a relief from stress. Likewise, since prolonged illness of a family member may be the stressor then the death of the parent, while certainly a significant loss, may in some way relieve an element of the stress brought on by the chronic strain of illness. Therefore, it is not enough just to ask youth whether they come from an intact or non-intact family. This dichotomy neglects important aspects about the structure that are more likely to be the "cause" of the stress in the lives of adolescents. Instead, questions pertaining to 'how' the family became disrupted, 'when' this event occurred and 'what' the precipitating circumstances were would provide more in-depth information about the context of the stressor.

In summary, the family is of central importance in the lives of adolescents and the stressors and strains experienced within this domain have a significant impact on their development and potential life course trajectories. The results of my analyses not only reinforce the importance of the family and the scope of its influence in regards to adolescent cannabis use, but also suggest that there are many facets within this domain that have differential impacts on adolescents. Some are relatively short lived (i.e. family disruption) and others are of a more persistent nature (i.e. poor family relationships). While both the acute and chronic family stressors are demonstrated to increase the likelihood of adolescent cannabis use, it is the erosion of family relationships that appeared to have more persistent effects leading to problem levels of cannabis use.
The School

A second life domain in which adolescents may experience a considerable amount of stress is school. Adolescents spend a significant proportion of their day in this environment and the importance of academic achievement for future life success remains a reality. Although there are a variety of potential sources of stress associated with education, two were examined in this thesis: academic attachment and perceptions of drug use in the school. This does not provide an exhaustive evaluation of possible school stressors an adolescent may experience. Other factors such as relationships with teachers and school rules for example may operate as stressors in the lives of students. The Ontario Student Drug Use Survey however was not designed to measures these stressors specifically.

The school is an important institution associated with the prevention of adolescent delinquency in that this environment has the potential to provide a substantial level of social control (Gottfredson and Hirschi, 1990). Indeed, previous research shows that as school attachment (i.e. performance, aspirations, involvement, satisfaction) increases, delinquency decreases (Hirschi, 1969; Kornhauser, 1978; Wiatrowski, Griswold and Roberts, 1981). Principles of the stress process model again offer additional insight into this relationship. If, in some way, the school environment becomes a source of stress for an adolescent, the potential foundation of social control the school can provide may erode and delinquency, including cannabis use, may be more likely to occur. That is, difficulties in school may be experienced as an ongoing problem or strain in the lives of adolescents. Concerns about academic achievement and future employment opportunities may be a general concern at this stage of
the life course\textsuperscript{78}. However, the increased pressures and competition to gain admission to university have likely magnified the importance of a successful high-school education and consequently the stress associated with not performing well in this environment. Further, young people’s sense of self-worth is often fragile and can be challenged and threatened by their perceptions of self-competence (Clayton, 1992). For those adolescents who experience difficulties with school, the threats to feelings of self-worth and competence may be particularly salient and constitute a source of substantial stress.

This thesis found support for the hypothesis that as the level of problems with school increased, so too did the likelihood the adolescents will use cannabis and use at problem levels. That is, when considering the demographic characteristics and family stressors, experiencing problems in school was significantly and positively associated with cannabis use and problem cannabis use. Therefore, while experiencing problems in school increased the odds that students used cannabis, this strain also appeared to have a more chronic and persistent influence on youth that led to their escalation of cannabis use.

The onset of academic problems may frustrate youth such that they seek to “escape” this stress with the use of cannabis. However, as this strain persists or intensifies, adolescents may become increasingly disillusioned with the benefits of school and become more involved in a drug use subculture. This group of teens may spend more time outside the school environment where supervision is less, and establish new networks with other drug using youth that may further encourage escalation of cannabis use. Besides experiencing difficulties

\textsuperscript{78} Whether this is recognized by the youth, reinforced by their parents or both remains to be examined.
in school, there are other aspects of school life that may significantly influence adolescent
cannabis use; the school environment itself may also have an impact on this behaviour.

The potential impact of contextual factors such as the role of the neighbourhood on
adolescent behaviours (including cannabis use) has been examined. However, we know much
less with respect to the role of the school environment. I suggested in this thesis that the
school environment may operate as a stressor in the lives of youth.

Epidemiological research suggests that the likelihood of adopting certain behaviours
may, to some extent, be influenced by the degree to which the behaviour has been adopted in
the community (Diex-Roux, 1998). Of particular interest in this thesis was the perception of
drug use as a problem in one’s school. Therefore, I hypothesized that perceptions of a
pervasive drug use subculture in one’s school may operate as an environmental strain in the
lives of adolescents that will influence their cannabis use.

The results of my analyses, however, failed to find a significant direct effect of
perceptions of school drug use on the probability of either cannabis use or problem cannabis
use. One possible reason for these non-significant findings relates to the measurement of this
variable. The question that captured school drug use asked adolescents whether they
perceived drugs to be a problem in their school. Those adolescents who use cannabis at
elevated levels may be less inclined to report drugs as problematic in their school environment
whereas those who abstain from use may view this as a substantial concern in their schools. If
this pattern of reporting is taking place, then this particular question may mask the
environmental factor I wanted to examine. Further, this question leaves it up to the
adolescent to define “problem”; asking questions that perhaps gauged the extent of witnessing
drug use or drug sales in or around the school may provide a better indicator of the nature of
the drug environment in the school context. Thus, the findings of non-significance must be
interpreted with great caution.

While it is possible that adolescents are resilient to their school drug use environment,
without more precise measurement of this construct, these conclusions are tentative at best.
Indeed, some of the preliminary analyses revealed that a larger proportion of cannabis users
did report drugs to be a problem in their school than did abstainers.

The school environment is integral to the study of academic strain and the principles of
the stress process model reinforce the importance of examining this aspect of cannabis use
further. Embedded in the stress process model is the notion that stress does not occur in a
vacuum; rather it is influenced by the surrounding environmental contexts in which individuals
find themselves. The extent to which drug use is a known and or visible aspect of the school
environment may increase the youth’s exposure to the drug (i.e., source of supply; networks
where one can learn how to use it) and therefore the likelihood of use. Therefore, dedicating
focused empirical attention to the school environment and how it is involved in the process of
adolescent cannabis or other drug use is an important research directive (Novak and Clayton,
in press).

In summary, regarding the impact of individual stressors, the utility of the stress
process model in explaining adolescent cannabis use is demonstrated by these analyses. The
model identifies the importance of considering the acute versus chronic nature of difficulties
adolescents may experience and how these influence different levels of cannabis use.

Successfully navigating adolescence is crucial to one’s future development and life
course trajectories. While the experience of individual types of stressors threatens or compromises this success, the experience of multiple stressors poses an even greater challenge for adolescents. Indeed, the number of stressors an individual must cope with is shown to be related to the likelihood of drug abuse (Clayton, 1992). Therefore, while the first portion of this thesis examined the role of individual family and school stressors on adolescent cannabis use, the second portion examined whether the number of stressors youths experienced was also associated with substance use outcomes.

**Cumulative Stressors**

Of those adolescents who report any stressor, there is a substantial proportion (47 percent) who indicate experiencing cumulative stressors. Research has shown that there are multiple combinations of stressors that increase the likelihood of cannabis use among youth. Therefore, Bry and colleagues (1982) suggested that a more advantageous route was to evaluate the influence of multiple stressors or cumulative stress on the likelihood of adolescent cannabis use. One objective of this thesis was to estimate the effects of cumulative stress on the probability of cannabis use. In doing so these analyses estimated the association between cannabis use and the number of stressors the adolescent reported.

There are two points to be raised regarding the effects of cumulative stressors based on the results of these analyses. First, as the number of stressors the adolescent experiences increases, so does the proportion of adolescents who report cannabis use and problem cannabis use. Indeed, among those youth reporting four stressors, roughly two-thirds of the sample indicated some level of cannabis use while only one-third abstained from use. Thus
“highly stressed” adolescents are significantly more likely to use cannabis.

Second, the relationship between cumulative stressors and cannabis use was further evaluated by multivariate logistic regression analysis that estimated the independent effect of cumulative stress, controlling for other relevant demographic factors. In doing so, these analyses estimated whether the odds of cannabis use and problem cannabis use significantly increased as the number of stressors reported by the adolescent escalated. I hypothesized that if the experience of single stressors was associated with an elevated probability of cannabis use, the pressures to cope with multiple stressors should be associated with a greater likelihood of cannabis use and problem cannabis use in particular. These findings indicated that, controlling for demographic factors, as the number of stressors increased the odds of cannabis use and problem cannabis use also increased significantly. I argued that if cannabis use is a coping response to the experience of stressors, then among those adolescents already using cannabis, the experience of multiple stressors may intensify and reinforce established patterns of coping. As anticipated, the accumulation of stressors appeared to have a greater impact for those adolescents already using cannabis. However, this difference was small and probably insignificant.

Overall, these findings suggest that cannabis use is not only a consequence of specific stressors and strains, but that this behaviour may also be adopted to cope with the experience of cumulative stress. This is not to say that all cannabis use reflects a coping mechanism. Indeed, some youth may simply enjoy the experience of using cannabis. However, it is possible that these enjoyable experiences may evolve into coping techniques should the youth be exposed to stressors. As suggested by Agnew’s (1992) general theory of strain, some
youth are poorly equipped to cope with stressful experiences in adolescence and thus turn to drug use as a means of dealing with these situations and feelings. Cannabis is one of the most accessible drugs to teenagers and thus, if they were going to turn to drugs, it is not unexpected that they would choose cannabis as a means of managing their stress. In addition to the availability of cannabis, there are also pharmacological reasons as to why this drug may be an appealing option for stress-management. The most commonly reported effects of cannabis use are sense of euphoria, increased talkativeness and laughter. This is alternated with periods of introspectiveness, lethargy and sleepiness (Adams and Martin, 1996; Hall and Solowij, 1998). Mood enhancement, anxiety reduction and even the more depressive aspects of use such as the feelings of mild sedation may be desirable to youth trying to cope with their feelings of stress and anxiety.

However, not all adolescents, even those who experience multiple stressors, engage in cannabis use. Isolating those factors that deter young people from cannabis use provides important information that might be used to develop more efficient and effective intervention and prevention programs and policies. That is, understanding what makes some youth resilient to the effects of stressors may inform future initiatives directed towards reducing both the onset of use as well as the progression of use to problem levels.

79 Alcohol is arguably the most accessible drug to adolescents and, although officially a legal substance, it is illegal for this subgroup of the population to buy or consume. Much of the research that has examined the relationship between stress and substance use has focused on alcohol abuse. Although beyond the scope of this thesis, it is likely the case that many adolescents turn to alcohol use as a means of coping with the stressors they experience. In fact, a portion of the adolescents who report abstaining from cannabis use may instead be consuming alcohol. Further, it is also possible that a proportion of cannabis users are also using alcohol to manage their stress. These are important issues that require further investigation.
The regulation of adolescent cannabis use has been assigned primarily to those promoting formal control measures, specifically the criminalization of cannabis use. Indeed, there remains a strong reliance on the criminal justice system to deter young people from drug use. However, in spite of the strong punitive approach to adolescent cannabis use, this behaviour persists and the effectiveness of this approach as a means of deterring cannabis use among young people is questionable. Some researchers have therefore turned their attention to the impact of informal social controls on cannabis use. However, this research has generally focused on the direct effects of these controls and on individual types of informal social control mechanisms. The analyses presented in this thesis examined the hypotheses that adolescents possess a level of informal social control based on the compilation of individual mechanisms that will promote resiliency against the negative effects of stress.

**Informal Social Control**

The stress process model suggests that adolescents initiate and escalate their cannabis use as a means of coping with a variety of stressors that arise within different life domains including the school and the family. However, this framework also describes the role of moderators that may insulate youth from the negative effects of stressors. Indeed, individuals exposed to similar stressors do not necessarily experience negative outcomes (Garmezy and Matsen, 1986; Rutter, 1987). Extending this notion to my research questions I argued that adolescents will be less likely to engage in early and problem cannabis use as a means of coping with stressors if they have other resources available to them that offset the stressors of adolescence and the pressures to use drugs.
The findings in my analyses indicated that the experience of stressors increased the likelihood of cannabis use, and also showed that 78 percent of these adolescents reported experiencing between one and four stressors. However, although cannabis is the most commonly used illicit substance among adolescents, 69 percent of adolescents in this sample abstained from cannabis use. Given the high percentage of abstainers, this suggests that there may be something insulating youth from the deleterious effects of stressors. Therefore, in addition to identifying those stressors that contribute to explanations of adolescent cannabis use, in this thesis I was interested in examining the role of one potential resource that may moderate the effects of these stressors on cannabis use: the role of informal social control.

Social control is an integral component to society. Formal control, typically in the criminal law, relies on the threat of punishment as a deterrent to “undesirable activities”, including cannabis use. However, research has largely failed to demonstrate a substantial impact of formal control on preventing cannabis use. Instead, it is suggested that the presence and perception of informal social controls are more powerful in dissuading individuals from violating laws including those surrounding cannabis use (Erickson, 1980: Grasmick and Bursik, 1990; Paternoster and Io-vanni, 1986).

Since most forms of drug intoxication are generally seen as pleasurable and enjoyable experiences, understanding not only what prevents use but what helps restrain levels of use is an important objective. Throughout this thesis I have drawn on the work of Maloff, Becker, Foneroff and Rodin (1979) who provide a rationale as to how people decide what they will take and when, and what prevents people from ingesting the maximum amount of a substance. They suggest that limits and boundaries around acceptable amounts of consumption are
established by and inherent to one's social group(s), rather than being enforced by agencies of formal control such as the police or government. That is, family, peers and one's personal beliefs (to cite a few mechanisms of informal social controls) construct guidelines regarding the “appropriate” limits of consumption. These limits, or the perception of them, are informal social controls that become internalized as accepted norms of behaviour and individuals regulate their consumption in accordance with these norms. Internalized informal social control may also reinforce what psychologists refer to as self-regulation which also operates to restrain substance use (Wills, 1990). The relationship between these two constructs should be examined further in subsequent research.

Other research has estimated the effects of individual informal social control mechanisms on different delinquency outcomes, including cannabis use. However, rarely, if ever, have these mechanisms been evaluated as an overall construct. That is, when individual items of informal social control (such as perceived health beliefs, personal and parental disapproval) become internalized, it is possible that they will converge into an overall level of informal social control that, in turn, becomes a part of a person's overall psychosocial make-up. Thus, informal social control becomes internalized into one's self-control. High levels of informal social control will therefore reinforce the desire to conform with the norms or boundaries of acceptable behaviour that are established by the individual's micro-environment. To this end, individuals either will not offend or will reduce participation in delinquent activities.

For these analyses I constructed a measure of informal social control based on five informal social control mechanisms: perceived peer drug use, parental disapproval, personal
disapproval, availability and perceived health risks. While I hypothesized that the level of informal social control would have a direct effect on reducing the likelihood of cannabis use, I also estimated whether the effects of the stressors on cannabis use were buffered by the presence of high informal social control.

Regarding the direct effects, a persistent main effect of informal social control was repeatedly observed throughout the analysis. That is, a significant and negative relationship between informal social control and cannabis use was found, and these findings were replicated in the analyses pertaining to problem cannabis use\(^8^0\). This suggests that adolescents with high levels of informal social control not only will be less likely to use cannabis, but also among cannabis users, those with high levels informal social control are less likely to progress to problem levels of use.

Finding that informal social control reduced the odds of cannabis use in comparison to abstaining was not surprising. When faced with the initial decision to participate in cannabis use, individuals with strong levels of informal social control will be more likely to “say no”. However, the fact that this relationship was also observed within the user group was particularly interesting. Participating in delinquent activities, such as using cannabis, is typically not a single event; rather adolescents may be faced with multiple choices to use or not to use. These results suggest that even among those who have made the choice (at least once) to use cannabis, the individual’s level of informal social control serves to restrain the

\(^8^0\) The results of these analyses indicated that for every increase in the level of informal social control the odds of cannabis use declined by 31 percent. Moreover, among those adolescents already using cannabis, as the level of informal social control escalated the likelihood of problem cannabis use was reduced by 19 percent.
level of their use.

In addition to estimating the main effects of informal social control, the stress process model describes the presence of resources that act as moderators to the negative effects of stressors. These resources serve to buffer the effects of stressors thereby reducing the likelihood of experiencing negative outcomes associated with stress. These analyses conceptualized informal social control as an internal resource developed from a constellation of individual informal control mechanisms. I hypothesized that high levels of informal social control would moderate the relationship between stressors and cannabis use as well as between stressors and problem cannabis use. However, on the whole, the results of these analyses failed to support these propositions; informal social control did not temper the effects of stress on the likelihood of these two outcomes. While these analyses failed to support my hypotheses, this does not establish that a moderating effect is not present. That is, it is possible that the effect is simply not strong enough to be detected by the statistical analyses used in these analyses or that the measures are neither specific nor sensitive enough.

Although overall there was little support for the stress-buffering hypothesis, one significant interaction did emerge from these findings. Among cannabis users, high informal social control buffered the effects of going to a school where the students perceived drug use to be a problem on the likelihood of problem cannabis use. This interaction suggested that informal social control offers some “protection” to those adolescents already using cannabis who also attend school where drug use is perceived as a problem. Therefore, despite the fact that this subset of adolescents is using cannabis and has arguably greater access to the drug and networks of other youth who use, those who possess high informal control are able to
maintain their use at non-problem levels. It is possible that informal social control is more strongly articulated in schools where drug use may be seen as a problem and, therefore, a stronger degree of disapproval is perhaps conveyed to or among adolescents. Why this effect is present only for those youth already using cannabis remains somewhat puzzling, and since it serves to help maintain use at moderate levels, should be examined further. This is however an encouraging finding for prevention as it does suggest that cannabis use can be contained for those youth who may have both the inclination and the opportunity to progress to heavier levels of cannabis use.

While psychosocial resources such as mastery and self-esteem have been identified in the mental health literature as potential protective factors (see Turner and Roszell, 1994), informal social control does not appear to offer the same buffering effects. This lack of effect may be due in part to the degree to which informal social control is, or is not, internalized in the adolescent. If there is not a certain degree of internalization, it may be that, regardless of the “level” of informal social control, this resource will not help restore or maintain internal or external equilibrium under significant threat. Further, informal social control may not foster, promote or develop an adolescent’s sense of self as do other psychosocial resources such as mastery and self-esteem. Therefore, the desire not to disappoint others or to sway from established limits of drug use may not protect youth from the feelings of loss of control or meaninglessness that stressors can produce (Spooner, 1999). Finally, it is also the case that not all protective factors necessarily produce resilience (Masten, Best and Garmezy, 1991). It is plausible then, that the protective process will not be sufficient to overcome some adversities experienced in adolescence. This is particularly the case if the vulnerability of the
youth or the magnitude of the adversity is too great to surmount (Masten et al., 1991).

Therefore, if some stressors experienced by adolescents produce a substantial amount of disequilibrium in their lives, internalized levels of informal social control may simply not be enough to provide the necessary protection against outcomes such as cannabis use or its escalation.

Informal social control is not a constant but rather is fluid in nature. It can be both strengthened and threatened by different circumstances that may include the experience of certain life events or chronic strains. Further evaluation of these more complex relationships between the experience of stressors and informal social control is needed. For example, what effect does the deterioration of family relationships have on an adolescent’s level of informal social control? If one of the internalized elements of this form of control reflects parental disapproval, these tensions could have a weakening effect on the overall level of informal social control.

In summary, these findings do not support a stress-buffering effect; rather the effects of informal social control seems to operate more so in the fashion described by social learning theory. Social learning theory suggests that involvement in delinquent acts, such as cannabis use, is less likely if there is little social reinforcement for the behaviour (Sutherland and Cressy, 1978). Informal social control, as measured in these analyses, reflects several elements of disapproval that I argued would discourage young people from using cannabis and from using at problem levels. Because this relationship has been demonstrated in previous research (Erickson, 1980; Grasmick and Bursik, 1990; Nagin and Paternoster, 1991b), that informal social control reduced the likelihood of cannabis use was not unexpected. However,
informal social control also regulated cannabis use among users by decreasing the odds of problem use. These findings reinforce the notion of established “acceptable” limits of use among adolescents. While for some the accepted limit may be abstinence for other subsets of the adolescent population there may be some established and accepted level of use. This observation reinforces those highlighted in a qualitative study of adolescents’ attitudes towards marijuana use (Warner, Room and Adlaf, 1999). There exists, among adolescents, a set of normative boundaries that distinguish those youth using cannabis on a social basis from those using it in isolation and/or on a frequent basis. Thus, among users there exists a known, acceptable level of use beyond which social sanctions or disapproval will follow.

The findings of these analyses, both those pertaining to the direct effects of the family and the school stressors, as well as the role of informal social control suggest several potential avenues of intervention. With rising rates of adolescent cannabis use and an increase in the proportion of youth using cannabis at problem levels, developing and implementing effective and efficient strategies to regulate adolescent cannabis use is an important research goal. The agencies held predominantly responsible for this task have historically been those that fall under a formal control regime: the police and the courts. Much research exists, however, that seriously questions the effectiveness of this approach and highlights instead the greater harms to youth produced by the criminalization of cannabis use (Erickson and Butters, 1998; Waldorf, Reinarman and Murphy, 1991). The results of this thesis provide further support for the development of an alternative approach to adolescent cannabis use that emphasizes the role of informal social control in promoting cannabis use regulation. Some examples of such types of interventions are discussed in the final chapter.
Chapter 8

Conclusion

8.1. Introduction

In the final chapter of this thesis I discuss how these analyses might inform program and policy initiatives directed towards adolescent cannabis use. Specifically, I suggest how the results presented in this thesis might contribute to a harm reduction approach to the prevention of, or intervention in youthful cannabis use. In addition, important methodological limitations of this thesis are described and finally, suggestions for future research are outlined.

8.2. Policy and program implications: Harm reduction and other suggestions

The effects of cannabis use on adolescent development are of particular concern for several reasons. Cannabis use, especially regular or problem use, may interfere with the successful transition from childhood to adulthood by increasing the risk of legal punishment or, for example, compromising the educational process. Further, early initiation of use may mean a longer period of use and of trying other drugs. Moreover, adolescence is a time of risk-taking and the use of any intoxicant may increase the propensity to take more chances and thus further add to the risk of injury or even premature death. Therefore, the development and implementation of effective intervention strategies is an important societal goal. While some of these strategies may be aimed specifically at cannabis use reduction or prevention, this should not be the only focus of these efforts.

There has been a general shift toward the application of more health-centred
approaches to drug policy. This movement is typically captured under the label “harm reduction”. Harm reduction evolved from the public health tradition and, since its early formulation in Liverpool, England, a century ago, has passed through four stages of development (Erickson and Butters, 1998). Although there remains some confusion and ambiguity around the term, harm reduction is defined as a “framework from which policy and program strategies are conceptualized, developed and implemented with the outcome goal being the reduction or minimization of harm (without requiring user abstinence or less consumption)” (Erickson and Butters, 1998: 179). Finally, there is a three-pronged focus to the goals of harm reduction81. That is, the goal of this movement is to decrease the adverse health consequences, social consequences and economic consequences of drug use without requiring decreased use.

The motivation for the application of harm reduction strategies to cannabis use was less related to concerns over the health consequences associated with use than with those attributable to the criminalization of use. That is, the harms related to the prohibition policy are thought to be out of proportion to those affiliated with use (Morgan, Riley and Chester, 1993). While this may, in general be the case, the potential health related consequences associated with problem and more chronic cannabis use are an important consideration that should also be addressed under a harm reduction framework.

Both the Netherlands and South Australia have been pro-active in the adoption of

policies constructed around a harm reduction framework. Canada, in spite of a strong orientation toward public health, remains more closely aligned with the “war on drugs” mentality. It is unlikely that Canada will abandon prohibition, though some form of decriminalization may occur (i.e., penalty reduction). When it can be clearly demonstrated that harm reduction approaches are a viable and effective intervention, or that emphasizing informal social controls will reduce cannabis use, they may be substituted for reliance on the law (Black, 1976). Indeed, it is clear that the deterrent effect of the law is minimal at best. Nevertheless, the inherent symbolic disapproval of cannabis use through the law may serve some purpose in setting a moral standard. That is, for some, the illegality of the drug will be enough to deter them from use simply because it is “wrong”. However, relying totally on such legal scare tactics ignores the fact that there is a large portion of adolescents for whom the legal threat associated with cannabis use is not a sufficient deterrent. Therefore, we must broaden the scope of interventions and policies geared towards drug use.

The results of the analyses presented in this thesis suggest that strengthening informal social control may serve to reduce the probability of cannabis use and, among users, the odds of progressing to problem levels of use. One area in which harm reduction approaches may be particularly effective is in the school. School-based drug education programs should strive to align themselves more closely with a harm reduction philosophy (effectively enhancing informal social control) in order to affect any positive change in adolescent cannabis use. The goal of school-based drug education programs is typically that of reducing the prevalence of use, focusing on the drug itself. These programs are often characterized by a narrow focus on individuals, inappropriate expectations, conflicts with norms or adult behaviour and the
lack of information regarding the benefits of experimentation (O'Conor and Saunders, 1992; Resnicow and Botvin, 1993). Alternatively, harm reduction approaches toward cannabis use stress the provision of accurate information (this includes the both the positive and negative effects of the drug), education and skills that will minimize the consequences of drug use for the users, community and culture (Poulin and Elliott, 1997).

It is virtually impossible to have a policy about informal social control (Maloff et al., 1979). While this may be the case, I have also argued that a basic level of informal social control is present in the lives of young people that affects the likelihood of their participation in delinquent activities such as cannabis use. Thus, while we cannot legislate what young people will tell each other about their experiences with cannabis, we can make information available to them about the consequences of use that could be shared through these informal channels. Making cannabis use an unappealing choice (perhaps by emphasizing health promotion) for young people through educational programs may serve to reduce the demand for the drug. These initiatives can either stress the elimination of behaviours that compromise health or reinforce, introduce or strengthen those behaviours that enhance health (Perry and Jessor, 1985). Overall, initiatives directed towards reducing the supply of cannabis to youth have failed. It is not very difficult to get cannabis. However, if we can curtail the extent to which youth want to use cannabis, then the availability of the drug may not affect usage.

Although most educational programs still reinforce the messages of formal social control and the "Just say no" philosophy, harm reduction is not an unfamiliar concept within educational programs. For example, sex education classes that promote condom use while not condoning early sexual activity recognize the reality of sexual experiences for adolescents
and provide youth with accurate information allowing them to make safer choices. The extension of these ideas to drug use is a viable option for school-based programs and would promote safe and knowledgeable cannabis use among adolescents. A further consideration is that one type of program will not be applicable to everyone.

Harm reduction approaches that provide adolescents with accurate information about cannabis may also strengthen informal social control. In addition to potentially altering one's own attitudes toward cannabis use, these strategies also extend beyond the individual to peers and parents. As discussed by Maloff et al (1972), acceptable limits and perceptions of accepted limits of use are established by the social groups to which the adolescent belongs. Therefore, if these groups of individuals are also presented with the same types of education programs, there is a greater likelihood that this information will be transferred to adolescents through channels of informal social control.

In addition to suggesting the continued push toward harm reduction programs and policies that educate youth about cannabis use and its consequences, there are other initiatives that can be taken toward reducing adolescent cannabis use. This research demonstrated the impact of stressors on the likelihood of cannabis use and problem cannabis use. Familial relationships and experiencing problems in school had a substantial impact on the odds of cannabis use. These findings suggest that early detection, intervention and support for troubled youth may also either prevent the onset of use or deter the progression of use to more serious levels. To evaluate this possibility further, longitudinal data on trajectories is required. Furthermore, if the principles of the gateway theory of drug use are correct whereby the use of drugs such as alcohol and/or cannabis increases the likelihood of other
drug use, then preventing the onset of cannabis use and perhaps the escalation of use should also reduce the probability that adolescents will move on to other more dangerous drugs.

It is obviously more difficult to intervene directly in the home. However, increasing awareness of adolescent stress and how strained familial relationships contribute to cannabis use may make some parents and teens or other family members more sensitive to these situations. Providing support to programs designed to foster family relationships and offer assistance to disrupted families that may be experiencing elevated levels of strain should continue.

School-based interventions addressing stressors are in some ways more easily adopted. The experience of problems in school was significantly associated with problem use and as those problems intensify so did the odds of using cannabis at these levels. Poor grades, low aspirations, minimal commitment to education (components of the general strain of problems at school) are all detectable aspects of this stressor. If these problems can be detected early-on and interventions set in place, it is possible to reduce the likelihood of problem cannabis use among adolescents who are perhaps already using casually. Further, while not the only contributing factor to cannabis use, the early detection of the signs and symptoms associated with stress by those within the school environment may facilitate the referral of these students to appropriate mental health services. Getting adolescents the help they need to deal with the stressors of this life stage may not only assist them through this disruptive life course stage but will foster better adult coping skills. In essence I argue that developing programs and initiatives that address those factors that constitute stressors in the lives of adolescents, and thereby affect their mental health, is a potentially important initiative in the education system.
These initiatives, however, need to take into consideration the fact that the process of schooling may itself be inherently stressful for adolescents.

Another possible focus of intervention initiatives centres on gender. These results showed a clear and persistent gender difference in the likelihood of problem cannabis use. Male adolescents are far more likely than females to escalate their use to problem levels once they have started using. Although further examination of this gender difference is required, these findings provide a preliminary suggestion that there may also be a need to develop programs that are more gender specific. At this point generic drug education programs are presented to both adolescent males and females. Clearly alternative strategies are needed that target male cannabis users as a higher risk group. These programs could be educationally-based providing specific information about the adverse health consequences of heavy cannabis use and/or other initiatives could focus on the prevention of other harms associated with use (i.e., driving after smoking or not knowing the quality and strength of what is smoked).

Finally, cannabis policy reform while not necessarily decreasing cannabis use, would have a significant impact on the negative consequences associated with the criminalization of adolescent cannabis use. That is, introducing a policy that adopted a less punitive approach could potentially eliminate both the immediate consequences of arrest, prosecution and criminalization and the long-term implications these experiences have across the life course. Delinquency and the consequences associated with these behaviours “mortgage” the adolescent’s future (Sampson and Laub, 1993). This is particularly salient for later life opportunities created by employment and schooling (Bondeson, 1989; Freeman, 1992). Arrest and incarceration are particularly stigmatizing and these negative effects influence job
stability and employment in adulthood.

Because the informal social control that we internalize is strongly influenced by our socialization, it is more challenging to develop ways of improving or strengthening this in individuals. The temptation to fall back on legal controls is therefore somewhat understandable; it is the easier approach. However, the strict prohibitionist approach that punishes the casual, experimental user may, in fact, have greater repercussions than their social use of cannabis. Therefore, seeking more of a middle-ground approach, perhaps akin to the more recently implemented “fine only” system in Australia without a criminal record (Single, Christie and Ali, 2000), or required community service or mandatory drug education (harm reduction based) programs, may provide, especially in the long run, a more efficient and constructive method of intervention. Regardless, those developing and implementing drug policy and programs should never lose sight of the fact that life course consequences stem not only from the actions of adolescents, but from those of adults as well.

Intervention efforts that focus only on eliminating or preventing cannabis use may merely be “bandaging” the situation and neglecting to address the root cause(s) of the drug use. That is, focusing on cannabis use per se fails to recognize that adolescents using cannabis, especially those using at problem levels, may be youth trying to cope with serious issues in their lives. Typically, those concerned with adolescent drug use have focused on policies and programs developed to prevent or restrain the drug use per se. The recent wave of research investigating adolescent cannabis use has emphasized the role of stress in adolescent drug use, including cannabis (Hoffman and Cerbone, 1999; Spooner, 1999; Special edition volume 31, number 14 of Substance Use and Abuse, 2000). This thesis furthers this
discussion by examining cannabis use as an outcome of the experience of stress. In doing so I hope to draw attention to the notion that this behaviour is perhaps a symptom of other difficulties in the lives of young people. Therefore, if cannabis use is an expression of these difficulties, then “treating” only this outcome masks the basic problem of troubled youth and reinforces stigma or exclusionary responses. Since most of these responses rely on the criminalization of cannabis, these youth may, in fact, be doubly punished. Cannabis use and problem cannabis use in particular is often part of a larger problem-behaviour syndrome that includes such things as delinquency and adolescent pregnancy (Jessor, 1991; Jessor and Jessor, 1977). Thus, the problems these adolescents are trying to cope with may also manifest themselves in other harmful behaviours: Failure to treat the root cause may simply generate a new pathway to other outcomes.

While the results of this thesis have provided insight into the relationship between stress and adolescent cannabis use, there are limitations to this work. The remaining portion of this chapter presents a review of some methodological issues that have limited my analyses, as well as a discussion of the future research objectives.

8.3. Methodological issues

A variety of limitations to this work are discussed in this section of the chapter. These include, the cross-sectional nature of the data used in the analyses, the type of data (i.e., student survey), the use of a single outcome measure in the analyses, and finally the measurement of informal social control.

First, the cross-sectional design of this study prohibits drawing conclusions regarding
the causal direction of the relationships observed. Throughout this study, although never explicitly stated, direction of causality has been assumed. However, a cross-sectional design does not provide the empirical support to make such a claim. This is the central weakness of studies that examine groups of individuals at only one period of time. While it is expected that changes in the independent variables (family stressors, school stressors and informal social control) are associated with changes in the dependent variable (cannabis use), it is imperative that caution be exercised when making such assumptions. Although experiencing stress in family and school domains is associated with cannabis use, it is also possible that cannabis use affects an adolescent’s relationship with their family as well as their academic success. The reciprocal relationships between these variables need to be fully examined. However, it should be noted that the results of these analyses conform to findings of some longitudinal research that indicates a causal sequence does flow from the experience of stressors to adolescent cannabis use (Newcomb et al., 1987). However, research by Farrell (1993) suggests that the “best fit” model may in fact reinforce the notion that stressors (or what he termed risk factors) may be both a cause and a consequence of a youth’s involvement with drug use, including cannabis. That is, the more stressors the youth is exposed to, the greater the likelihood of cannabis use. Once using cannabis, more frequent use tends to elevate the exposure to other factors that, in turn, increase cannabis use.

The generalizability of these results to all adolescents is also limited. By design, the survey is restricted to a school sample of adolescents. Therefore, data cannot be generalized to non-school adolescents. When studying youth, researchers have tended to rely on school-based samples to conduct their studies. As identified recently in the work of Hagan and
McCarthy (1997), there are several benefits associated with the type of research. For example, these surveys provide scientists with large samples of young people and, therefore, one is able to conduct more sophisticated quantitative analyses. These analyses provide more comprehensive and accurate information pertaining to youth. Finally, because of the systematic nature in which the variables were measured in these surveys, it is also possible to evaluate their causal role with respect to delinquency.

Although there are benefits to this type of self-report methodology, this approach has been somewhat restricted to junior and senior high school students. This limits our understanding and appreciation of the complexity of issues that surround behaviours such as cannabis use. One reason for this is that student surveys do not capture the extent to which behavioural changes take place in non-student groups of young people. The reliance on student surveys may, in fact, contribute to an underestimation of the types of problem behaviours young people engage in. This is evident when examining rates of substance use. Trend data and analyses, in both Canada and the United States, illustrate a period of escalation in drug use that continued into the early 1980s but then showed a steady decline until the early 1990's when it increased again (Ontario Student Drug Use Survey 1996; Kipkle et al., 1997).

There is also evidence suggesting that drug use actually continued to increase within specific subgroups of adolescents even when the population rate declined (Kipkle et al., 1995a; Robertson, 1989). These groups include runaway and homeless street youth populations where research has demonstrated substantially higher rates of alcohol and illicit drug use than

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82 Although most 14 to 16 year olds are still in school, there is a portion of adolescents who may have left home and are living on the streets or drop out of school for significant periods of time.
are evident in the general adolescent population (Yattes et al., 1988).

In addition, these data are based on self-reports. As a result, they may underestimate the amount of drug use resulting from either intentional under-reporting or unintentional memory loss. However, research assessing the validity of self-reported drug use in school-based surveys demonstrates these reports are valid, particularly when the anonymity of the students is maintained (Akers et al. 1983; Campanelli, Dielman and Shope 1987; Harrison and Hughes, 1997; Johnston and O’Malley 1985; Wagenaar et al. 1993).

A further methodological consideration pertains to the nature of the analyses conducted in this thesis. My results are based on secondary data analysis and are thus limited by the variables and data available in the Ontario Student Drug Use Survey. This survey is extremely comprehensive and provides a wide range of important variables that were incorporated into these analyses. However, there were also some limitations to this data set. One limitation is related to the design of the 1997 wave of the OSDUS. This wave was designed to obtain epidemiological estimates and therefore the data were not well suited to construct more macro-level measures of school-level variables. Therefore, potential school environment stressors were not incorporated into these analyses. Although I did use a proxy-measure for the school drug use environment that gauged student’s perceptions of drug use in their school, there were some limitations with this measure as well. Specifically, the measure was somewhat limited in the language used (the fact that users may be less likely to report drug use as a ‘problem’) and in that there was only a single item available to be used to tap into the student’s school environment. Therefore, this measure may not adequately capture the drug use environment in the adolescents’ schools, which could account for the non-
significant findings generated in these analyses.

A final methodological issue relates to the measure of informal social control. My evaluation of this resource generated an adequate degree of reliability and the factor analysis indicated that these items reflected a single construct. However, these items and the subsequent measure do not represent the definitive construct of informal social control. Most research examining informal social control has concentrated on individual mechanisms of control rather than evaluating the possibility of an overall construct, or cumulative level, of control present in an individual’s life. There has been minimal research examining the presence of an overall level of informal social control. Thus, it is possible that the lack of significant interactions may reflect the particular composition of the measure of informal social control. Certainly further tests and evaluation of this construct are required.

While there are limitations to all research, this does not negate the value and importance of what these analyses have found. The exposure to stressful life events and chronic stressors in adolescence is clearly associated with an increased likelihood for cannabis use and problem cannabis use. For most adolescents, cannabis use is experimental in nature and does not interfere with other aspects of their lives, but this is not the case for everyone. There is a growing subset of the adolescent population that is using this drug at elevated levels (Ontario Student Drug Use Survey, 1997). Between 1997 and 1999, the proportion of adolescents who used cannabis 40 or more times in the past year, used daily in the month preceding the survey and/or reported using 4 or more joints when they did smoke, all increased. Further, in 1999 there was a significant increase in the proportion of adolescent cannabis users who reported all three problem cannabis use indicators (1.7 percent versus 7.2
percent). This degree of use may seriously jeopardize their health, increase the risk of prosecution and compromise future life course trajectories. These analyses illustrate the role of specific family and school stressors in this process and suggest potential avenues of intervention. There are certainly many more levels of complexity associated with adolescent cannabis use that remain to be fully explicited. However, this thesis has at least begun to unravel elements of this process. Based on the discussion of the limitations associated with this thesis, as well as the general findings of my research, the following section outlines a series of suggestions for future research initiatives.

8.4. Suggestions for future research

The following section of this thesis discusses several suggestions for future research initiatives. Specifically, I describe one general research design suggestion, three aspects of the stress process model that could be built upon and one specific substantive issue worthy of further exploration.

One of the main limitations of the analyses in this thesis has been the cross-sectional nature of the data. Throughout these chapters the direction of causality has been assumed, congruent with prospective research concluding that stress is a predisposing factor for substance use and not a consequence of drug use (Newcomb and Bentler, 1986; Seltzer and Oechsli, 1985; Wills, 1986). However, as previously alluded to, while the experience of stressors is likely associated with adolescent cannabis use, cannabis use may also affect the experience of stressors. This may be particularly the case when considering stressors of a more chronic nature. That is, while experiencing problem in school may result in cannabis
use, cannabis use may subsequently amplify the adolescent's problems in this environment. A similar relationship may also exist between cannabis use and the deterioration of family relationships. Therefore, if the processes associated with adolescent cannabis use are to be understood more fully, longitudinal research is necessary. This type of data will provide a more comprehensive depiction of the processes associated with adolescent cannabis use and allow for a much greater appreciation of the complexities associated with this behaviour. The causal relationships between stressors, moderators and cannabis use are far from simple. Rather, more complex, reciprocal relationships are likely to exist. That is, although the stress process model shows the progression from stressors to outcome, this is not necessarily the end of the model. The experience of whatever outcome is being examined has its own set of implications. Therefore, developing models with appropriate data that allow for the estimation of recursive models (see Raskin-White and Hansell, 1998 for example) would add greatly to the understanding of the processes associated with adolescent cannabis use.

Another important area for future research examining adolescent cannabis use that adopts the stress process model, is to develop measures that assess how the 'stressors' are experienced by youth. That is, it is not necessarily the case that coming from a non-intact family, for example, is experienced as a stressor by all youth. In fact, the experience of a divorce may result in a relief of stress. Therefore, in addition to asking youth whether that have experienced labelled life events or chronic strains, questions pertaining to the degree to which they see these events as negative, or requiring some resolution, would greatly add to our understanding of the experience of stress.

A related point refers to the need to expand the types variables we include in the
estimation of models that predict drug use. As discussed by Petraitis, Flay and Miller (1995), there are different types and levels of influence when considering behaviours, of which adolescent drug use is one. There are three distinct types of influences described by Petraitis et al. (1995) that include: social and interpersonal influences, cultural or attitudinal influences and intrapersonal influences. These influences, and the theories they stem from, can also be situated along a continuum of levels: proximal, distal and ultimate. To develop a more comprehensive and integrative understanding of a behaviour such as adolescent drug use, incorporating variables into an analysis that span a range of influence is necessary. That is, developing testable models that include not only those factors that are highly predictive of a given behaviour (i.e., the immediate precursors of behaviour), but also those that provide an indication of the long-term roots of the behaviour. These include those factors that affect behaviour through their impact on the more proximal, cognitive-affective influences, as well as the broad, macro-level social environmental elements that may put an adolescent at risk for drug use but not directly 'cause' the behaviour (e.g., neighbourhood, social institutions).

The results of this thesis also suggest the need for future research to continue to explore factors that promote resiliency. Not all adolescents who experience stress also use cannabis. Understanding the factors or psychosocial resources that protect youth from the negative effects of stress would provide valuable information for program and policy development. Specifically, probing the different coping strategies youth employ when they are confronted with stressful situations and evaluating whether they are successful would advance our understanding of this aspect of the stress process model. Furthermore, while preventing all adolescent cannabis use may be an unrealistic goal, developing strategies that prevent
problem cannabis should be a key objective. Therefore, in addition to looking at those factors that prevent some youth from ever using cannabis, specific attention should also be paid to those youth who use cannabis, but maintain their use at non-problem levels.

The outcome measure used in this research focused on adolescent cannabis use. While this study moved beyond the use verses no-use dichotomy and examined problem cannabis users, additional refinements to this outcome measure would provide additional valuable information. For example, what are the factors that contribute to cessation among youth? Does a resolution to the stressor contribute to the choice to stop using, or does the cessation of cannabis use reflect the onset of other drug use? Further subdividing adolescent cannabis users and re-estimating stress models would improve the understanding of how the stress process influences the continuum of cannabis use. Moreover, while identifying factors that predict a single substance use outcome such as cannabis use provides very valuable information, many adolescents are poly-drug users. This poses considerable risks to their physical well-being, has greater potential legal consequences and consequently, substantially threatens their life course trajectories. Therefore, future research in this area should develop and evaluate stress process models that focus on adolescents who are poly-drug users.

Finally, this thesis finds a persistent relationship between gender and cannabis use such that male adolescents are significantly more likely to use cannabis at problem levels. There are, however, several aspects of this finding that require further elaboration. For example, are adolescent girls not using drugs to cope or are they using substances other than cannabis? Male adolescents tend to control cannabis distribution; perhaps adolescent girls are more likely to use alcohol or other substances such as diet pills. Another possibility is that for
adolescent girls the effects of stressors may be experienced though a worsening of their mental health. Although in adult samples the gender gap in the experience of depression has narrowed, it remains the case that females are more likely than males to report depressive symptomatology (Nolen-Hoeksema, 1987). Therefore, future comparative analyses should be conducted that estimate the effects of stressors on different outcome variables for male and female adolescents. In addition to depression, there may be other psychological outcomes, such as eating disorders, typically more applicable to young women that would better reveal the underlying stress process. Understanding how potential threats to the mental health of adolescent males and females is expressed will inform intervention initiatives.

In addition to estimating models that predict different outcomes for male and female adolescents, further attempts should be made to unravel the mechanisms that underlie the relationship between gender and problem cannabis use. Within the stress literature, two competing hypotheses have been proposed that may provide guidance in this matter: the exposure and the vulnerability hypotheses. Some argue that certain individuals, or groups of individuals, encounter a greater number of potentially stressful events or circumstances (Kessler, 1979; Turner and Avison, 1989). The competing hypothesis suggests that individuals differ in their capacity to adjust or resolve stressful situations and are, therefore, more or less vulnerable to stress (Turner and Avison, 1989). Numerous explanations have been offered to account for this differential vulnerability. For example, it has been argued that individuals lacking social support systems (Belle, 1982) or positive coping strategies (Pearlin and Schooler, 1978) are less capable of resolving stressful situations and are, therefore, more susceptible to distress. Testing these hypotheses then, may provide a better understanding of
the mechanisms that underlie the observed gender differences in cannabis use.

Many theories of adolescent deviance have focused on aspects including social bonds and control and differential association. However, rarely has the youth's mental health been considered in these theories. There are many complex processes that influence adolescent cannabis use and the stress process model provides a very useful tool to address these issues by identifying how stressors and strains experienced in adolescence stimulate or intensify cannabis use. Although there remain many unanswered questions, this is a growing area of investigation as evidenced by a recent special issue volume 31, number 14 of *Substance Use and Misuse* devoted to research examining the relationships between stress and substance use.

8.5. Conclusion

A central theme in criminology identified trajectories, turning points and transitions across the life course and how these experiences influence future events. Life transitions are defined as stages that influence an individual's trajectory or developmental pathway (Sampson and Laub, 1993; 1997). One particularly significant transition that influences future life course development is adolescence. Adolescence, a crucial stage of the life course, can be a very difficult and stressful time for young people. The successful management of the stressors and strains experience at this time has lasting implications across the life course.

In this thesis, I described and estimated one potential pathway of drug use and drug use escalation in early to middle adolescence. Drawing on the stress process model I argued that the probability of cannabis use and problem cannabis use increases when adolescents experience stressors in their lives. The stress process model's conceptualization of the
experience of stress events is similar to the proposition that the life course is affected by transitions that influence the probability of participation in criminal behaviour (Sampson and Laub, 1993). In contrast to the types of events typically identified as life course transitions (i.e. marriage, first job), transitions that represent stressors may be more uncontrollable in nature and perceived in a very negative light among adolescents. Further, as coping mechanisms and resources also develop across the life course young adolescents are potentially very ill-equipped to manage the stressful situations they encounter. The experience of uncontrollable events or persistent stressors may contribute to a sense of powerlessness and inefficacy among adolescents. These feelings of low personal control, lack of direction and meaninglessness create a disequilibrium in the lives of adolescents and stimulates the search for a manner in which to alleviate this distress. Cannabis use is one such method (Sher and Levenson, 1982).

The stress process model places adolescent drug use within a broader social environment, recognizing that deviant behaviour, like drug use, does not occur in a vacuum. Rather behaviours are greatly influenced not only by the roles individuals occupy, but also the actions and behaviours of others within that environment. While the stress process model stands alone as a tool to understand adolescent drug use, it also compliments other theories and perspectives associated with adolescent deviance. In particular, this model adds to the social control (social bonding) theory of delinquency by offering a possible explanation as to 'why' weak bonds and poor attachment contribute to adolescent deviance, and also why some youth are more resilient to the challenges of adolescence. The stress process model and a life course perspective also complement each other well. The stressors and strains experienced
across the life course are not only generated by different transitions and turning points, but may also affect the trajectory of individual development. The resolution and lack of resolution of stress and strain will alter future trajectories and influence the success of subsequent life course transitions. For example, the coping mechanisms we learn in our youth will greatly affect the success with which we manage the complexities and challenges of adult life.

Until recently, the stress process model was primarily used in areas of mental health to understand the processes associated with psychological illnesses. However, this model provides a useful tool for explicating the pathways into delinquent activities, like cannabis use, as well. This thesis has contributed to the further development of this integration in both conceptual and empirical ways, and proposed directions for future research.
REFERENCES

Adams, I., and B. Martin

Adlaf, E., and F. Ivis

Adlaf, E., F. Ivis, and R. Smart

Adlaf, E., A. Paglia, and F. Ivis

Ageton, S., and D. Elliot
Agnew, R.


Agnew, R., and H. White


Agresti, A.


Akers, R., M. Krohn, L. Lanza-Kaduce and M. Radosevich

Akers, R., J. Massey, W. Clark and R. Lauer


Aldrich, H. and F. Nelson


Alexander, B.


Allison, K., E. Adlaf and D. Mates


Allison, K., and C. Dignam


Amato P., and B. Keith

Aneshensel, C.

Aneshensel, C., and M. Rutter and P. Lachenbruch

Attar, B., N. Guerra and P. Tolan

Avison, W., and I. Gotleib

Avison, W., and D. McAlpine
Bachman, J., L. Johnston, P. O’Malley and R. Humphrey

Bailey, S., R. Flewelling and J. Rachal

Bairnes, G., and J. Welte

Baites, P.

Bardo, M., and M. Risner
Bates, M., and T. Blakely


Becker, H.


Berdiansky, H.


Belle, C.


Billings, A., and R. Moos


Bishop, D.

1984a “Legal and extralegal barriers to delinquency.” Criminology 22: 403-419.
Black, D.


Blackwell, J.


Blum, R.


1972 "White, middle class families." In W. Henry and N. Sanford (Eds.), *Horatio Alger's Children.* London: Jossey-Bass.

Blumstein, A., J. Cohen, J. Roth and C. Visher (eds.)


Boyd, N.


Boyle, M., and D. Offord


Boyle, M., P. Szatmari, D. Offord, and K. Merikangus


Brody, G., and R. Forehand

1992  "Prospective associations among family forms, family processes and adolescents' alcohol and drug use."  Behavior Research Therapy 31: 587-593.

Brook, P., M. Whiteman, C. Nomura, A. Gordon, and P. Cohen

Brook, P. Cohen, M. Whiteman and A. Gordon

1992 “Psychological risk factors in the transition from moderate to heavy use or abuse of drugs.” In Vulnerability to Drug Abuse

Brook, J., D. Brook, A. Gordon, M. Whiteman and P. Cohen


Brown, S.


Brown, G., and T. Harris


Bry, B.


Bry, B., P. McKeon and R. Pandina

Budd, R., J. Eiser, and M. Morgan

Burnside, M., P. Baer, R. McLaughlin and A. Pokorny

Butters, J., and P. Erickson
1999 "Addictions as deviant behavior: Normalizing the pleasures of intoxication." In L. Beaman (ed) *New Perspectives on Deviance: The Construction of Deviance in Everyday Life*.

Cadoret, R.

Calabrese, R.
Campanelli, P., T. Dielman and J. Shope

Carins R.

Chassin, L.

Chen, K., and D. Kandel

Clayton, R.
Clayton, R., C. Leukefeld, L. Donohew, M. Bardo and N. Harrington

Cloward, R., and L. Ohlin

Cohen, S and T. Wills
1985 “Stress, social support and the buffering hypothesis.” Psychological Bulletin 98: 310-357.

Compass, B., G. Davis and C. Forsyth

Compass, B., P, Orosan and K. Grant
Conners, G. and A. Tarbox

Cook, S.

Cronkite, R.C. and R.H. Moos

Crundall, I.

DeMaris, A.
Dent, C., S. Sussman and B. Flay
1993 “The use of archival data to select and assign schools in drug prevention trials.”
Evaluation Review 17:159-181.

Denton, R., and C. Kampfe

Diez-Roux, A.

Dishion, T., and R. Loeber
1985 Adolescent marijuana and alcohol use: the role of parents and peers revisited.

Decher, E., and R. Oerter
Dohrenwend, B.

Dohrenwend, B., and B. Dohrenwend

Dryfoos, J.

Dubnoff, S.

Duncan, D.

Dupont, R.
*Substance Use and Misuse* 31: 1929-1945.
Eccles, J., C. Midgley, A. Wigfield, and D. Rueman

Elder, G.

Eliason, S.

Ellickson, P., K. Bui, R. Bell and K. McGuigan

Elliott, D., D. Huizinga, and S. Ageton

Ensil, W., and N. Lin
Ennett, S., and K. Bauman


Ennett, S., R. Flewelling, R., Lindrooth and E. Norton


Erickson, P.


Erickson, P., and J. Butters


Erickson, P., V. Watson and T. Weber


Erickson, P., and T. Weber


Esbensen, F., and D. Elliott


Farnworth, M.

Farrell, A.

1993 “Risk factors for drug use in urban adolescents: A three-wave longitudinal study.”


Farrell, A., D. Anchors, S. Danish and C. Howard


Farrington, D.


Fergusson, D., L. Horwood, M. Lynskey


Fischer, B., P. Erickson and R. Smart

Flewelling, R., and L. Bauman

Flewelling, R., S. Ennett, J. Rachal and A. Theisen

Fox, J.

Foxcroft, D., and G. Lowe
Friedman, A.

Garmezy, N.

Garmezy, N., and A. Matsen

Gibbs, J.


Giffen, P., S. Endicott and S. Lambert
Gore, S., R. Aseltine, and M. Colton

Goode, E.


Gottfredson M., and T. Hirschi

Grasmick, H., and L. Appleton

Grasmick, H., and R. Bursik
Grasmick, H., and D. Green

Greenberg, D.

Guerra, N., L. Huesmann, P. Tolan, R. Van Acker

Hagan, J., and B. McCarthy

Hagan, J., and A. Palloni
Hagan, J., and B. Wheaton

Hall, W., and N. Solowij

Hall, W., N. Solowij and J. Lemon

Hamburg, B., H. Kreamer, and W. Jahnke

Hamilton, L.

Hansell, S. And H. White
Harding, W., and N. Zinberg

Harrison, L., and A. Hughes

Hathaway, A.

Havighurst, J.
1982 Developmental Tasks and Education. New York: Longman.

Hawkins, J., R. Catalano and J. Miller
Hawkins, J., D. Lishner, J. Jenson and R. Catalan0

Hepburn, J.

Hennessey, M., P. Richards and R. Berk

Hill, D.

Hirschi, T.

Hoffman, J.
1995  “The effects of family structure and family relations on adolescent marijuana use.”

The International Journal of the Addictions 30: 1207-1241.

Hoffman, J., and F. Cerbone

1999  “Stressful life events and delinquency in the transition to adolescence”. Criminology
37: 343-373.

Hoffman, M., R. Levy-Shiff, S. Sohlberg and J. Zarizki


Hoffman, J., and A. Miller

1998  “A latent variable analysis of general strain theory.” Journal of Quantitative
Criminology 14: 83-110.

Hoffman, J., and S. Su

1997  “The conditional effects of stress on delinquency and drug use: A strain theory

Holmes, T and R. Rahe

Homel, R.


Huba, G., M. Newcomb and P. Bentler


Hundleby, J and G. Mercer


Isohami, M., I. Moilanen and P. Rantaballio


Jenkins, J.

Jensen, G.


Jensen, G., and D. Brownfield


Jessor R.


Jessor, R., J. Chase, and J. Donovan

Jessor, R., J. Donovan and F. Costa


Jessor, R. and S. Jessor


Jessor, R., J. Van Den Bos, J. Vand ERRyn, F. Costa and M. Turbin


Johnstone, B.


Johnston, L.

Johnston, L., P. O’Malley and J. Bachman


Kandel, D.


Kandel, D., and K. Andrews

Kandel, D., and M. Davies

Kandel D., R. Kessler and R. Margules

Kandel, D., and I. Logan

Kessler, R.

1995a “Substance use and injection drug use behaviors among street youth in four US cities.” Presented at the annual meeting of the American Public Health Association, San Diego, CA.
Kipke, M., and S. Montgomery, T. Rimon and E. Iverson

Krohn, Marivin, A. Lizotte and C. Perez
1997 "The interrelationship between substance use and precocious transitions to adult statuses." *Journal of Health and Social Behavior* 38:87-103.

Kumpfer, K.

Laub, J and R. Sampson

Lazarus, R.S. and S. Folkman
Le Dain Commission (Commission of Inquiry into the Non-medical Use of Drugs).


Lettieri, D.


Levy, P., and S. Lemeshow


Long, J., and D. Scherl


Maccoby, E., and J. Martin


Maddahian, E., M. Newcomb and P Bentler

Maloff, D., H. Becker, A. Foneroff and J. Rodin

Marco, A., and S. Bahr

Masten, A., K. Best, and N. Garmezy

Matza, D.

Matsueda, R., and K. Heimer

Meier, R., S. Burkett and C. Hickman
Meier, R., and W. Johnson
1977 "Deterrence as social control: The legal and extralegal production of conformity."

Miller, S., and S. Simpson

Minor, W., and J. Harry

Monroe, S.

Morgan, J., D. Riley and G. Chester
Morgan, P. and J. Teachman

Morris, R.

Murray, D., C. Perry, C. O'Connell and L. Schmid

McCarty, D.

Nagin, D., and R. Paternoster
Needle, R., S. Su and W. Doherty
1990  “Divorce, remarriage and adolescent substance use: A prospective longitudinal study.”

Newcomb, M.

Newcomb, M. and P. Bentler


Newcomb M and M. Felix-Ortiz
Newcomb, M., G. Huba and P. Bentler


Newcomb, M., E. Maddahian and P. Bentler

Newcomb M., E. Maddahian, R. Skager and P. Bentler
1987 "Substance abuse and psychosocial risk factors among teenagers: Association with sex, age, ethnicity and type of school.” American Journal of Drug and Alcohol Abuse 13:413-433.

Nolen-Hoeksema, S.

Novak, S., and R. Clayton
O'Connor, J., and B. Saunders


Oetting. E., and F. Beauvais


O’Malley, P., J. Bachman and L. Johnston


Pandina, R., and J. Schuele


Paternoster, R.

Paternoster, R., and L. Iovanni

Paternoster, R., L. Saltzman, T. Chiricos and G. Waldo

Paternoster, R., L. Saltzman, G. Waldo and T. Chiricos


Pearlin, L.

Pearlin, L., I. Monton, A. Lieberman, E. Menaghan and J. Mullan
Pearlin, L., and C. Schooler


Perry, C., and R. Jessor

1985 "The concept of health promotion and the prevention of adolescent drug abuse."


Peterson, A., R. Kennedy and P. Sullivan


Petraitis, J., B. Flay and T. Miller

1995 "Reviewing theories of adolescent substance use: Organizing pieces of the puzzle."

*Psychological Bulletin* 117: 67 - 86.

Piercy, F., R. Volk, T. Trepper, D. Sprenble and R. Lewis


Piliavin, I., R. Gartner, C. Thornton and R. Matsueda

Poulin, C., and D. Elliott

Radwanski, G.

Raskin-White, H., and S. Hansell

Ray, O., and C. Ksir

Reardon, B., and P. Griffing

Resnick, M., L. Harris and R. Blum
Resnicow, K., and G. Botvin

Rhodes, J and L. Jason

Robertson, M.

Robins, L.

Rollins, B., and D. Thomas
Rutter, M.

Saltzman, L., R. Paternoster, G. Waldo and T. Chiricos

Sampson, R., and J. Laub

Sarvela, P., and E. McClendon

Savas, D.
Scheier, L., M. Newcomb and R. Skager

Schneider, A.

Sellin, T.

Selnow, G.

Seltzer, C., and F. Oechsli

Selye, H.
Shaw, C and H. McKay


Sher, K., and R. Levinson


Siegal, L.


Single, E., P. Christie and R. Ali


Single, E., and D. Kandel

Skager, R., and D. Fisher

Smart, R.

Smart, R., Adlaf, E., and G. Walsh

Smith, G., and C. Fogg

Smith, D., and R. Paternoster
Sokol-Katz, J., and P. Ulbrich


Solomon, R.


Solomon, R., and M. Green


Solomon, R., E. Single and P. Erickson


Spooner, C.


Steinberg, L., N. Mounts and S. Lamborn

1991 "Authoritative parenting and adolescent adjustment across varied ecological niches." 

Su, A., J. Hoffman, D. Gerstein and R. Johnson


Sutherland, D.


Sutherland, E., and D. Cressey


Swadi, H.


Tabachnick, B., and L. Fidell

Tec, N.
1974  “Parent-child drug abuse: Generational continuity or adolescent deviancy?”
*Adolescence* 4:351-364.

Teevan, J.

Thoits, P.

1995  “Stress, coping and social support processes: Where are we? What’s next?” *Journal of Health and Social Behavior* (Extra Issue); 53-79.

Thomas, C., and D. Bishop
Thornberry, T.


Title, C.


Turner, J., and W. Avison


Turner, J., and P. Roszell

Van Voorhis, P., F. Cullen, A. Mathers and C. Carner


Wagenaar, A. and C. Perry

Waldo, G., and T. Chiricos

Waldorf, D., C. Reinarman and S. Murphy
Warr, M., and M. Stafford

Warner, J., R. Room, and E. Adlaf

Warner, J., B. Fischer, R. Albanes and O. Amitay

Warner, J., T. Weber, and R. Albanes
1999 “Girls are retarded when they’re stoned.” Marijuana and the construction of gender roles among adolescent females.” *Sex Roles* 40: 25-42.

Weisburd, D., E. Waring and E. Chayet
Wells, L., and J. Rankin


Wheaton, B.


Wiatrowski, M., and D. Griswold and M. Roberts


White, H., R. Pandina and R. LaGrange

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Wills, T.


Zimmer. L., and J.P. Morgan


Zimring, F., and G. Hawkins

APPENDIX A

Items from the 1997 Ontario Student Drug Use Survey

Q1. How old are you?
   10. 10 years of age or younger
   11. 11 years
   12. 12 years
   13. 13 years
   14. 14 years
   15. 15 years
   16. 16 years
   17. 17 years
   18. 18 years
   19. 19 years
   20. 20 years of age or older

Q2. Are you male or female?
   1. Male
   2. Female

Q3. How would you describe your family's financial situation?
   1. Well-above average
   2. Somewhat above average
   3. Average
   4. Somewhat below average
   5. Well-above average

Q4. During an average weekend, how much time do you spend with your family?
   1. A great deal of time
   2. Some time
   3. A little time
   4. Very little time
Q5. How well would you say you are getting along with your parents?
1. I am getting along very well with my parents
2. I am getting along okay with my parents
3. I am not getting along well with my parents

Q6. When you have problems can you talk to your mother about them?
1. Always
2. Usually
3. Sometimes
4. Seldom
5. Never
6. My mother is not living

Q7. When you have problems can you talk to your father about them?
1. Always
2. Usually
3. Sometimes
4. Seldom
5. Never
6. My father is not living

Q8. In your free time away from home does your mother or father know where you are?
1. Always
2. Usually
3. Sometimes
4. Seldom
5. Never

Q9. With whom are you currently living?
1. I live with both natural parents
2. I live with my natural father only
3. I live with my natural mother only
4. I live with one natural parent and one stepparent
5. I live with neither of my natural parents
Q10. What marks do you usually get in all your subjects at school?
1. Unsatisfactory (below 50%)
2. D - poor (50% - 59%)
3. C - fair (60% - 66%)
4. B - good (67% - 79%)
5. A - outstanding (80% - 100%)

Q11. Not everyone expects to go as far in school as they would like. How likely is it that you will stay in school until you graduate?
1. It is not at all likely that I will graduate
2. It is not very likely that I will graduate
3. It is fairly likely that I will graduate
4. It is very likely that I will graduate

Q12. Compared to other students in your school, how do you rate yourself in the school work you do?
1. Far below average
2. Below average
3. Slightly below average
4. Average
5. Slightly above average
6. Above average
7. Far above average

Q13. On average, how much time do you spend doing homework each week outside school?
1. No homework at all
2. Less than 1 hour per week
3. About 1 to 2 hours per week
4. About 3 to 4 hours per week
5. About 5 to 6 hours per week
6. About 7 or more hours per week

Q14. Some people like school very much while others don’t. How do you feel about going to school?
1. I like school very much
2. I like school quite a lot
3. I like school to some degree
4. I don’t like school very much
5. I don’t like school at all
Q15. In your school, is drug use a big problem, a small problem or no problem at all?
1. A big problem
2. A small problem
3. No problem at all

Q16. How much do you think people risk harming themselves (physically or in other ways) if they try cannabis (marijuana, pot, grass) once or twice?
1. No risk
2. Slight risk
3. Medium risk
4. Great risk
5. Do not know

Q17. How much do you think people risk harming themselves (physically or in other ways) if they smoke marijuana regularly?
1. No risk
2. Slight risk
3. Medium risk
4. Great risk
5. Do not know

Q18. If you use cannabis during the next 12 months how likely is it that you would develop health problems?
1. Very unlikely
2. Unlikely
3. Likely
4. Very likely

Q19. How do you think your parents feel (or would feel) about you trying marijuana once or twice?
1. Strongly disapprove
2. Disapprove
3. Not disapprove
4. Don't know
Q20. How do you think your parents feel (or would feel) about you using marijuana regularly?
1. Strongly disapprove
2. Disapprove
3. Not disapprove
4. Don’t know

Q21. Do you disapprove of people (19 or older) trying cannabis (marijuana, pot, grass) once or twice?
1. Do not disapprove
2. Disapprove
3. Strongly disapprove

Q22. Do you disapprove of people (19 or older) smoking marijuana regularly?
1. Do not disapprove
2. Disapprove
3. Strongly disapprove

Q23. How easy or difficult would it be for you to get cannabis (also known as “pot”, marijuana, “grass”, hashish, “hash”, hash oil) if you wanted some?
1. I do not know what cannabis is
2. It would be impossible for me to get cannabis
3. It would be very difficult for me to get cannabis
4. It would be difficult for me to get cannabis
5. It would be easy for me to get cannabis
6. It would be very easy for me to get cannabis

Q24. How many of your close friends have used cannabis in the last 12 months?
1. None of my friends
2. Some of my friends
3. About half of my friends
4. Most of my friends
5. All of my friends
Q25. In the last 12 months how often have you used marijuana?
   1. I do not know what marijuana is
   2. I have never used marijuana in my lifetime
   3. I have used marijuana but not in the last 12 months
   4. I used marijuana 1 or 2 times in the last 12 months
   5. I used marijuana 3 to 5 times in the last 12 months
   6. I used marijuana 6 to 9 times in the last 12 months
   7. I used marijuana 10 to 19 times in the last 12 months
   8. I used marijuana 20 to 39 times in the last 12 months
   9. I used marijuana 40 or more times in the last 12 months

Q26. During the last four weeks, on occasions when you have used marijuana how many joints did you typically smoke? (If you shared joints with others, count only the amount that you smoked.)
   1. I do not smoke marijuana
   2. Less than 1 joint
   3. About 1 joint
   4. 2 to 3 joints
   5. 4 or more joints

Q27. Have you ever tried to stop using marijuana or hashish but found that you couldn’t stop?
   1. Yes
   2. No
   3. I have never used marijuana or hashish

Q28. Thinking back over your whole life, has there ever been a period when you used marijuana or hashish every day or almost every day for at least a month?
   1. Yes
   2. No
   3. I have never used marijuana or hashish

Q29. In the last 12 months, have you tried to cut down your use of marijuana or hashish?
   1. Yes
   2. No
   3. I have never used marijuana or hashish
APPENDIX B

MEASUREMENT TABLES

MEASUREMENT TABLE 1: Control variables

<table>
<thead>
<tr>
<th>Concept</th>
<th># items</th>
<th>Original items</th>
<th>Reconstruction</th>
<th>alpha</th>
<th>range</th>
<th>mean</th>
<th>standard deviation</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
<td>1</td>
<td>Q1</td>
<td>None</td>
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<td>10 - 20+</td>
<td>15.38</td>
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<tr>
<td>Gender</td>
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<td>Q2</td>
<td>Recode Male = 1 Female = 0</td>
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<td>0 - 1</td>
<td>.476</td>
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<td>Socio-economic status</td>
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### MEASUREMENT TABLE 2: Stressors

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<th>range</th>
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<th>standard deviation</th>
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<tbody>
<tr>
<td>Family relations</td>
<td>5</td>
<td>Q4</td>
<td>Recode Q4, Q5, Q6, Q7 &amp; Q8 to reflect increasing stress</td>
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<td>Q4</td>
<td>0 = great deal</td>
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<td>1 = some</td>
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<td>2 = little</td>
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<td></td>
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<td>3 = very little</td>
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<td></td>
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<td>0 = very well</td>
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<td>1 = okay</td>
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<td>scores on each of the variables</td>
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<td>2, 3, 4, &amp; 5 = 1</td>
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### MEASUREMENT TABLE 2 - Stressors continued

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<th>standard deviation</th>
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<td>3 = 1 - 2 hours</td>
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<td>Q14</td>
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<td>1 = quite a lot</td>
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<td>2 = some</td>
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<td>3 = not very</td>
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<td></td>
<td>4 = not at all</td>
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</table>

**A compute procedure was run** summing the scores on each of the variables creating a new variable (EDUPROB)
<table>
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<th># items</th>
<th>Original items</th>
<th>Reconstruction</th>
<th>alpha</th>
<th>range</th>
<th>mean</th>
<th>standard deviation</th>
</tr>
</thead>
</table>
| School drug use    | 1       | Q15            | Recode 3 = 0, 1 & 2 = 1  
New variable SCHDRUG reflects perceptions of any level of problem | 0 - 1 | .79   | .41  |       |
# MEASUREMENT TABLE 3: Items used to construct Informal Social Control

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<tr>
<th>Concept</th>
<th># items</th>
<th>Original items</th>
<th>Reconstruction</th>
<th>alpha</th>
<th>range</th>
<th>mean</th>
<th>standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived health risks</td>
<td>3</td>
<td>Q16, Q17</td>
<td>Recode Q16, 17 18 to reflect higher level of perceived health risk</td>
<td>.68</td>
<td>0 - 11</td>
<td>6.24</td>
<td>2.96</td>
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<td>0 = no risk</td>
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<td>1 = slight risk</td>
<td></td>
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<td></td>
<td></td>
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<td>2 = don’t know</td>
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<td></td>
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<td>3 = medium risk</td>
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<td>4 = great risk</td>
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<td>Compute procedure used to create a new variable (HLTHRSK); high score reflects increased perceived health risks</td>
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<tr>
<td>Parental disapproval</td>
<td>2</td>
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<td>Recode Q19 &amp; 20 to reflect high degrees of parental disapproval</td>
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<td>0 - 4</td>
<td>3.24</td>
<td>1.26</td>
</tr>
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<td>Recode</td>
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<td></td>
<td>0 = do not disapprove</td>
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<td>1 = disapprove</td>
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<td>2 = strongly disapprove</td>
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<td>Compute procedure used to create a new variable (PARDIS)</td>
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<td>1 = disapproval on 1</td>
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<td>2 = disapproval on 2 OR strong disapproval on 1</td>
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<td>3 = disapproval on 1 AND strong disapproval on 1</td>
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<td>4 = strong disapproval on both</td>
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### MEASUREMENT TABLE 3 - Items used to construct Informal Social Control continued

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<th>range</th>
<th>mean</th>
<th>standard deviation</th>
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<td>Personal disapproval</td>
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<td>0 = do not disapprove</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>New variable (LOWAVAIL); high scores reflect low levels of availability. Don’t know was coded between difficult and easy (see chapter 3 for details)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer drug use</td>
<td>1</td>
<td>Q23</td>
<td>Recode</td>
<td></td>
<td>0 - 4</td>
<td>2.98</td>
<td>1.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 = all</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 = most</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 = about half</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 = some</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 = none</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>High score of new variable (PEERUSE) reflects low levels of peer drug use.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### MEASUREMENT TABLE 3A: Construction of Informal Social Control

<table>
<thead>
<tr>
<th>Concept</th>
<th># items</th>
<th>Original items</th>
<th>Reconstruction</th>
<th>alpha</th>
<th>range</th>
<th>mean</th>
<th>standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal Social Control</td>
<td>5</td>
<td>Hlthrsk, Pardis, Pdis, Avail, Peeruse</td>
<td>Factor analysis of the five items was conducted. All items loaded on to a single factor with an eigenvalue of 2.66. A reliability analysis was conducted on the items (alpha = .73) A composite measure (INFORMAL) was created by summing the five component variables</td>
<td>.73</td>
<td>0 - 28</td>
<td>16.54</td>
<td>6.50</td>
</tr>
</tbody>
</table>
**MEASUREMENT TABLE 4: Construction of the dependent variable cannabis use**

<table>
<thead>
<tr>
<th>Concept</th>
<th># items</th>
<th>Original items</th>
<th>Reconstruction</th>
<th>alpha</th>
<th>range</th>
<th>mean</th>
<th>standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>1</td>
<td>Q25</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>1</td>
<td>Q26</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependence</td>
<td>3</td>
<td>Q27</td>
<td>No recode necessary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q28</td>
<td>Count procedure used on three items to create score (0 - 3) reflecting the number of dependency issues reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dependent Variable:**

Cannabis use

Dependent variable (CANSTAT) based on the following criteria:

- **Abstainers** (canstat = 1): report never using cannabis or not knowing what it is

- **Moderate use** (canstat = 2): those using less than 20 times a year, smoked 1 or less joints in past 4 weeks AND indicate 0 - 1 dependency items.

- **Problem use** (canstat = 3): those report 2+ dependency items AND either frequency of using 20+ time in last month OR smoking 2 - 4+ joints when they use in the last 4 weeks.

**Canstat**

1 = abstainer (70.2%)
2 = moderate (21.6%)
3 = problem (8.2%)