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The development and evaluation of a model of drug education for adolecents

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THE DEVELOPMENT AND EVALUATION OF A MODEL OF DRUG EDUCATION FOR ADOLESCENTS.

A thesis submitted in fulfilment of the
requirements for the award of the degree

Doctor of Philosophy

from

The University of Wollongong
by
Jeffrey Wragg, B.A., M.A.(Hons).

Department of Psychology

1992

University of Wollongong

Candidate's Certificate

I certify that the thesis entitled **The Development and Evaluation of a Model of Drug Education for Adolescents**, and submitted for the degree of Doctor of Philosophy, is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed .....

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ABSTRACT

The recognition that drug related problems have major economic, social and personal costs has led to the emergence of prevention as an important issue. In comparison to supply reduction and treatment approaches drug education appears to hold the most promise, but this promise had been slow to materialise. Many drug education programs used in Australian schools, at the time this study was being planned in 1982, did not appear to be based on a clear philosophy or theoretical rationale. Nor was there any adequate evaluation of these programs. Although a few positive signs regarding what might offer the promise of success had begun to emerge in the literature, most programs failed to show clear evidence of adequate theoretical development and appropriate evaluation methodology. The current research emerged from such a background in 1982. The purpose of this study has been to develop and evaluate a drug education program based on an adequately developed theoretical model.

The model developed in this research has been derived from an analysis of the literature on adolescent drug use, drug education, and the nature of adolescent development. The characteristics of adolescence, in combination with a number of environmental and personal factors, appear to predispose some adolescents to a stage of increased susceptibility to harmful influences. In order to explain why there are individual differences regarding susceptibility to drug use a number of drug use theories and research studies investigating factors correlated with adolescent drug use were examined.

An analysis of the literature concerned with the causes of drug use suggested that at least four loosely defined theoretical groupings can be identified. The four categories include a biogenetic or drug effect group, a psychological group, a socialisation or social learning theory group and finally a psychosocial group. The social-learning and psychosocial theories have, more adequately, attempted to examine the nature of adolescent drug use and the interaction of a number of variables believed to be causally related to adolescent drug use. These theories have attempted to incorporate social, psychological and developmental perspectives into complex, but unified models. They appear to offer the most appropriate theoretical base from which models of drug education can be developed. In order to bridge the gap between aetiological research and program construction a number of the most relevant and important variables that account for a significant proportion of the variance, were examined as part of a model building process. The model of drug education developed in this research also integrated educational principles that could assist in the translation of a conceptual framework to a school based drug education program.

A number of hypotheses were developed in order to evaluate the effectiveness of the intervention program developed from a psychosocial developmental influences model. A pre and post test intervention and non-intervention group longitudinal design was used to test the ability of the program to change attitudes to drug use and drug use behaviour. A total of 619 students from a total of seven primary schools participated. Four schools were randomly assigned to an intervention condition (n=362), and the remaining three schools were given no intervention (n=257).

A self report questionnaire was designed and used to obtain data at pre and post test stages as well as for the longitudinal follow up stage (from Grade 7 to Grade 10). Approximately 71% of the original sample had data available for 5 out of a total of 6 data collection points. A smaller sample of 239 subjects (longitudinal sample) provided data at all 6 collection points. Analyses were conducted with both the longitudinal sample and the larger cross-sectional sample of students who had completed questionnaires at any of the data collection points.

A comparison of intervention and non intervention attitudes to drug use indicated that after intervention significant differences emerged. Path analysis was used to examine the nature of the relationship between attitudes and drug use prior to, during, and following the onset of drug use. A noticeable pattern of changes appeared to occur just prior to the onset of drug use or at the grade where drug use actually commenced. These changes underline the importance of stabilising attitudes in order to minimise the chances of drug use occurring.

Drug use behaviour was examined for five groups of drugs; alcohol, tobacco, analgesics, marijuana and a range of illegal or non-prescribed substances (e.g., heroin, inhalants). Three categories of use were examined, these being incidence, frequency and amount used. Results indicated that for alcohol, tobacco and marijuana use significant drug taking differences between intervention and non intervention groups emerged. No significant differences appeared to exist for the use of analgesics. Although a number of statistically

significant differences were found with regard to the use of illegal or non prescribed substances a consistent pattern across all grades failed to emerge. Intervention group subjects reported significantly greater ability to resist peer influences to take drugs and also a delayed age of onset for drug use.

Additional analyses examined the association between involvement in sports and hobbies, socio-economic status, gender and drug use. Gender and socio-economic status appeared to play a minor role in determining drug use. Significant relationships were found in relation to drug use and participation in certain sports and hobbies. Rugby football players and surfers appeared to be linked to significantly greater levels of drug use whilst joggers or tennis players showed reduced levels. It has been argued that providing adolescents with 'alternatives' could reduce the levels of drug use, but these results suggest that a 'naive' interpretation of an alternatives to drug use theory cannot be supported.

At the conclusion of this study evidence has been provided to suggest that a psychosocial developmental influences model of drug education can not only change attitudes and drug use behaviour, but also sustain these changes over a considerable period of time. Methodological constraints such as loss of information and small sample size, due to attrition, limit the possible range of generalisation from this study. Nevertheless comment can be made regarding the theoretical framework on which the psychosocial developmental influences model has been based. The use of peer leaders, peer group commitment procedures and teacher and parent involvement appears to be of value in the development, promotion and maintenance of a

perceived normative environment that opposes health injurious drug use. Principles derived from persuasive communications and psychosocial innoculations theory, as well as the theory of reasoned action, have all been placed with a social learning theory context in which positive peer pressure has been utilised and negative peer pressure to use drugs opposed. Further research is needed to determine which particular elements within the aetiological framework and implementation structure underpinning the psychological developmental influences model can provide the most useful and economical combination of program elements. The findings of the present research add impetus, however, to a sparse but developing body of literature which suggests that a school based psychosocial development influences model has the potential to decrease adolescent drug use.

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Path Analysis of non-drug users

Chapter One: The Nature of The Drug Problem in Australia and the Importance of Prevention.

Adolescence is a time when young people are confronted with a number of tasks and challenges to growth and development. Young people are generally quite healthy, yet this level of health can become significantly impaired, both in the short term and certainly in the long term by the early or inappropriate use of tobacco, alcohol, marijuana and a range of other substances, both legal and illegal. The evidence regarding drug use in the general community indicates that the drugs which are causing most health, social and economic problems are alcohol, tobacco, legal pharmaceutical and illegal drugs, in that order. (Daube, 1987; Howat, Binns, Blaze-Temple & Corti, 1987; Senate Standing Committee, 1977). This pattern is equally true amongst children and young adults and as MacDonald (1984) points out, these levels of drug use are unacceptably high. Although current evidence points towards a decline, or at least a slowing down in the levels of drug use by adolescents (Directorate of the Drug Offensive, 1990), public concern over the issue of drug abuse among children and adolescents remains consistently high.

Initiation into substance use is primarily an adolescent phenomenon that occurs within the context of the adolescent's expanding physical, psychological and social development. During adolescence young people typically experiment with a wide range of behaviours and lifestyle approaches as part of the natural process of acquiring their own sense of identity and independence from parents. Coates, Peterson and Perry (1982) point out that during adolescence individuals are in the process of developing life long patterns of behaviour that have the potential to be either health threatening or

health enhancing. The formation of positive and healthy lifestyles in adolescence can be influenced significantly by the degree to which a teenager becomes involved in drug and alcohol use.

1.1 The Nature of The Adolescent Drug Use Problem

At the time of the 1989 New South Wales Schools Survey 39% of males and 31% of females aged 16 used alcohol at least weekly. At this age 34% of boys and 16% of girls reported feeling drunk or very drunk at the end of a drinking session. Approximately 50% of males in Grade 10 and nearly 30% of females indicated they had consumed five or more drinks in a row during the last two weeks. The 1986 New South Wales Schools Survey of drug use indicated that approximately 40% of Grade 10 students drank alcohol at least weekly and almost 30% of Grade 10, 15-16 year old students reported having more than 5 drinks in a row at least once each fortnight. A modest decline of about 3-4% in the prevalence of weekly use in terms of age adjusted rates occurred between 1986 and 1989, but the population of heavy drinkers in the older age groups did not appear to change significantly during this time period.

Baker, Homel, Flaherty and Trebilco (1986) comment on the nature of heavy drinking and make the point that drinking alcohol until drunk shows an age related peak for both boys and girls at age fifteen. If at this age behaviour patterns for the future are being established, then these levels of alcohol consumption give considerable cause for concern. A survey of New South Wales Technical College Students in 1987 provides additional insight into the patterns of drug use that older adolescents and young adults

develop. Forty percent of male students aged between 15 and 19 reported becoming a bit 'drunk' or 'tipsy' more that once a month, and 15% of male students indicated they became very drunk or sick more than once a month. Sixty percent of students questioned indicated that they usually ended up 'tipsy or merry', while 27% stated that they usually ended up drunk; only 13% of the sampled group of students remained sober. Prill, Newman and Relich (1987) came to the conclusion that most technical college students drank in order to become 'tipsy' or 'drunk'. This conclusion could also be directed towards a significant proportion of 15-16 year old school students.

The New South Wales School Surveys taken between 1971 and 1983 indicated a considerable increase in tobacco use amongst adolescents. Tobacco use appeared to reach a peak in 1983 when approximately 35% of males and 38% of females aged 16 years indicated they were current smokers. By 1986 25% of males and 31% of females were current smokers and by 1989 current smoking rates for sixteen year olds had dropped to 18% for males and 25% for females. The trend towards declining tobacco use is consistent with declines in student smoking rates around the world (Johnston & Harrison, 1984) The rate of decline in smoking is consistent with a similar trend for adults (Chapman & Carrol, 1983).

Between 1983 and 1989 there were some fairly significant decreases in the frequency of use of legal drugs by students in New South Wales. Marijuana use did not show the same degree of change. For males across all age levels cannabis use remained relatively stable between 1983 and 1989. Female rates of cannabis use have always been less than that of their male counterparts, and between 1983 and

1989 a modest decline in levels of use has been noted. Marijuana use by Technical College students aged 15-19 years was considerably higher than the school survey data for 16-17 year olds in New South Wales. Thirty percent of Technical College students surveyed in 1987 reported using marijuana on a monthly basis, and this is three to four times more than reported by school students aged 15-17. Tobacco use for Technical College students aged 15-19 was thirty one percent. These figures appear to indicate that for at least a significant proportion of young people the rates of drug use rise considerably after they leave school and enter young adulthood. Reduced rates of drug use reported in school surveys may therefore be considered for some, as nothing more than a temporary delay in a progression towards even higher levels of drug use occurring after leaving school.

1.2 The Impact of The Drug Problem on the Health of the Community

The recent downturn or levelling off of adolescent substance use occurring over recent years must be kept in perspective. At this stage it is not clear if the current halt in drug use is a temporary phenomenon and it is important that a wider perspective is maintained. During the last two decades young people have generally increased their levels of drug use. Epidemiological research indicates that drug use has spread downwards by age, as young people now use drugs which were formerly used by much older individuals. Spread is also occurring in relation to a multiplicity of substances available to young people from a variety of sources across all social classes and geographical boundaries. Another form of spread has been outward by sex. In the past, female tobacco use, alcohol use and use of other drugs has not been at the same level as that of their male

counterparts. But now female use is similar to drug use by males. For some substances, and in some circumstances female usage may exceed male usage levels.

The drop in drug use over the past few years is encouraging. However there can be no opportunity to engage in any degree of complacency or self-congratulation when some 25,000 Australians die every year from drug related problems (Commonwealth Department of Community Services and Health, 1989). In the general community tobacco use was linked to 71% of all deaths caused by drug use in 1987. Alcohol use was implicated in a total of 6,621 deaths and this represents 26% of all deaths in 1987. Only 1% of the total of all drug deaths was caused by opiates whilst other drugs including barbiturates and a range of legally obtained drugs account for the remaining 2% of all deaths. The data obtained from the Commonwealth Department of Community Services and Health (1989) suggest that in 1987 in the 15 - 34 age group, almost one death in three was drug-caused.

The most obvious indicator of drug and alcohol use and misuse may well be statistics on morbidity yet the effects of alcohol and drugs on a community are wide ranging. In addition to economic and cost factors associated with hospitalisation and medical treatment a range of other problems, such as violence, property crime, industrial accidents, marital breakdown and an increasing awareness has emerged that illegal drugs are threatening the criminal justice and political systems.

The level of drug and alcohol use in Australia and the problems linked to unacceptable levels of use pose a serious threat to the health of a significant proportion of the population. The damage done by the 'drug problem' should in no way be underestimated. Harm to individuals through death, illness, or disability as well as the social and financial costs associated with drug misuse indicate the extent of the problem.In summarising the evidence regarding death and lost years of life in the 1987 Commonwealth Department of Health's publication "Statistics - Drug Abuse in Australia", the conclusion reached is that most drug problems "are related to the use of alcohol and legally available drugs, even among children and young adults" (p15).

The trends which suggest that the levels of drug use and drug related problems are decreasing or levelling off have occurred so recently that we are not in a position to determine if we have "turned the corner" in relation to the drug problem or if the drop is merely a temporary respite in a developing pattern towards higher levels of drug use. Irrespective of which account we consider probable current levels of drug use are unacceptably high.

1.3 The Prevention of Drug Abuse: A Priority

A fundamental concern of any government is the general level of health and well being of the community. The costs associated with health care are substantial.In this context the misuse of legal and illegal drugs poses one of the most serious threats and certainly one of the most preventable health risks of our time. A large proportion of the costs associated with drug related problems goes directly towards

treatment or rehabilitation costs. These services can do little to stop or prevent the problem occurring as they are reactive not proactive agents in the cycle of drug misuse. In an effort to seize the initiative in the drug war governments have diverted significant funds towards the setting up of special police units whose responsibility is to prevent illegal drugs entering the community. Willis (1985) estimated that the success rate in terms of illegal drug intercepts and confiscations was between 4 and 7 percent and certainly less than 10%. Police seizures concentrate on illegal drugs as the causes of the drug problem whilst largely ignoring the problems associated with legal use. The evidence indicates that alcohol and tobacco alone accounted for 97% of all drug-related deaths.

The recognition that alcohol and drug related problems have major economic, social and personal costs has led to the emergence of prevention as a key issue in Australia and other countries (Howat et al, 1987). If individuals can be influenced at an age when attitudes, beliefs and behaviour patterns for life are being formed, then the potential for harm reduction and protection from subsequent drug and alcohol misuse problems may be achieved. In comparison to treatment and supply reduction approaches drug education appears to hold the most promise. However this promise has been slow to materialise.

1.4 The Failure of Previous Drug Education Models to Prevent Drug Use

Early programs based on 'intuition' or 'a priori' logic failed. Drug educators turned to a growing body of research based mainly on studies of current or past drug addicts. The application of research

from a population of drug addicts to the emergence of drug use behaviour in the normal adolescent population was problematic but this was coupled with the assumption that variables associated with addict populations were causally related to the problem of drug abuse when in fact they were only correlational. These problems were further exacerbated by a superficial reading of the literature resulting in simple, univariate remedies being applied to a complex problem. Many educational endeavours grew out of a need to do something and to do it quickly (Smart & Fejer, 1974). In consequence the history of drug education during the past two decades has not been tremendously impressive or inspiring. The vast majority of drug and alcohol education programs failed to show any positive results in what is clearly the most rigorous test of effectiveness; the subsequent use of drugs and alcohol. (Goodstadt, 1974; Hanson, 1982; Kinder, Pape & Walfish, 1985; Tobler, 1986; Schaps, Di Bartolo, Moskowitz, Palley & Churgin, 1981).

1.5 The Setting for this Study

In Australian schools by the end of the 1970's and early 1980's, a substantial amount of drug education had occurred in schools and the confused and often inappropriate strategies that had characterised previous program attempts were reflected and perpetuated in educational settings. Benjamin (1978) pointed out that drug education in Australian schools "tended to be inadequate, unplanned, unco-ordinated and unevaluated" (p.56). A few positive signs appeared to be emerging from the literature available in the early 1980's that indicated a general improvement in the ability of drug education to produce positive changes. The changes appeared to be minimal however and positive evidence was still sparse.

Drug and alcohol problems have multiple causes and therefore a variety of strategies are needed at community,government and multisectorial levels (Nowlis,1981; Rootman, 1985). An understanding of both the nature of adolescence and the contextual and situational variables associated with adolescent drug use is needed in order to provide a framework from which drug education can proceed. With hindsight, it is now possible to trace the beginnings of the early psychosocial programs of the late 1970's and early 1980's,but in 1982 as this drug education program was being formulated, a clear perspective had not emerged. Many studies continued to examine a number of dependent variables, with a range of different drug use behaviours and claimed varying levels of success. It was still extremely perplexing and worrying, at that time, to read the latest review of drug education research available in the literature.After examining 127 drug abuse prevention programs, Schaps, Di Bartolo et al. (1981) concluded that only minor effects on drug use behaviour and attitudes could be claimed for the vast majority of programs examined. The conclusion reached by Schaps et al. (1981) however, was that results were tentatively encouraging regarding the "new generation" prevention programs, but it was clear that positive results could only be anticipated if the intensity of these programs was significant, in terms of duration, scope and persistence.

1.6 The Need to Develop Models of Drug Education Based on a Clearly Articulated Conceptual Framework.

The focus of this research is upon adolescent drug and alcohol use and the development of effective drug education programs. In response to an unprecedented level of activity in the area of drug

education in Australia there is a clear need to examine the most suitable and successful education strategies that can be employed in order to reduce adolescent drug use. In order to develop programs based on a sound theoretical and empirical basis it is important to develop a model of drug education that is derived from an understanding of :

1. the developmental nature of adolescence,
2. aetiological factors underlying adolescent drug use and misuse, and
3. educational principles derived from past drug education endeavours.

In 1985 drug prevention and education activity increased significantly with the launching of the National Campaign Against Drug Abuse. Although it is commendable that there is increased interest in drug education, it is vital to ask if this upsurge in activity is based upon a clearer philosophy and understanding of adolescent drug misuse and drug education principles than was previously the case (Wragg, 1987). Kraus in 1979 pointed out that although the old information giving approaches in drug education had been replaced by a new approach involving a focus on effective living, there was still no real evidence to demonstrate the effectiveness of drug education in Australia. Many program endeavours were not based on a particular model of drug education or understanding of adolescent drug misuse. Program goals or objectives were not always specified and even when they were many objectives were often unrelated to subsequent drug use. Drug educators made assertions about the nature and efficacy of programs without reference to empirical evidence and when studies were evaluated there was often a gross inadequacy in scientific methodology (Berberian, Cross, Lovejoy & Paparella, 1976; Goodstadt,

1980; Hanson, 1982; Randall & Wong, 1976, Schaps et al, 1981). The current study emerged from such a background in 1982. The problems associated with drug education were far from resolved and a range of unsubstantiated claims were being made for a variety of programs. At that stage in Australia there appeared to be no sound educational philosophy of drug education nor any form of substantial evaluation of what might appear to offer the promise of success. Australia was certainly not alone in this predicament. Drug misuse continued to escalate whilst educational program designers struggled to make sense of a substantive body of emerging evidence regarding the nature of drug abuse prevention and the aetiology of adolescent drug use.

Drug education programs need to be based on a carefully developed conceptual framework or model rather than on a pot-pourri of ideas and intuitive notions deemed to be causally related to adolescent drug use. Programs based on a conceptual framework, if tested empirically, can provide information regarding the relevance of the model's underpinnings and upon future drug education endeavours. It is the purpose of this research to more fully explore the nature of adolescence and the causes of adolescent drug and alcohol use, in order to develop and evaluate a model of drug education based on relevant empirical and theoretical knowledge. The next chapter will begin a model building process by examining the characteristics of adolescent development that may create a period of increased susceptibilty to the influences that encourage drug use.

Chapter Two: The Developmental Characteristics of Adolescence that May Increase the Likelihood of Drug Use

The characteristics of adolescence, in combination with a number of environmental and personal factors, may create a vulnerable stage of development in which young people are more susceptible to negative influences. This chapter examines the nature of the developmental changes that occur in adolescence which may predispose young people to use drugs.

Adolescence is a period during which young people progress from childhood to acceptance as an adult. There are cultural variations that exist in relation to the length of adolescence and its particular form of existence, but in most Western cultures adolescence is a time of change, exploration and exuberance. It is a time of searching and a key task in adolescence is that of identity formation. The young person begins the task of forming a more mature image of himself or herself and this development is supported by the maturation of cognitive processes. As these processes mature adolescents are better able to examine their place in the world and their relationship to values, beliefs, morals and social behaviours. As young people move from childhood to adolescence they begin to question previously accepted beliefs or value systems of parents and others. Their developing cognitive maturity permits a reassessment and appraisal of all that has gone before in terms of its relevance to themselves and their future (Coleman, Hersberg & Morris, 1977). However, these developmental changes may place some young adolescents at risk for drug use.

Adolescence is generally regarded as a time when young people explore their identity and experiment with alcohol and other drugs. At this time they begin to develop patterns of behaviour that may affect the rest of their lives (Coates, Peterson & Perry, 1982). The majority of young people pass through adolescence without undue stress, but some may experience problems. Many of the causes associated with these problems have been present throughout childhood, but it is usually not until adolescence that they become manifest. Problems such as family conflict, peer relations, retarded academic progress and inadequate personal skills, may set the scene for subsequent problem behaviour. The characteristics of early adolescence in combination with some of these significant environmental and personal factors, may combine to create a vulnerable stage of development in which young people are more susceptible to negative influences.

2.1 The Impact of Cognitive Maturational Changes on Previously Held Beliefs and Attitudes Regarding Drug Use

Children in middle and late childhood are normally still within the stage of concrete operational thought (Piaget, 1972). They are dependent on the physical or concrete properties of concepts and essentially remain anchored to current or recent concrete experiences. As adolescence emerges young people move towards the stage of formal operations. In this stage they are able to move beyond the mere physical properties of the environment and consider a range of possibilities regarding their identity, social role and future. They are able to compare and contrast one set of propositions or values with others and analyse a range of possibilities inherent in a particular

problem. The shift from the concrete operational stage to a fully developed level of formal thinking is gradual.

Younger children, aged 9 or 10, are still in the concrete operational stage of cognitive development and they accept that smoking is harmful and so behave accordingly. A younger child`s acceptance of the health risks associated with smoking are experienced at a very concrete and immediate level. If confronted by parental use of tobacco young children may break their father's cigarette in half, or refuse to kiss their mother if she has been smoking. Young children may become very concerned and cry because they believe that a smoking parent may suddenly die and therefore they `nag' and point out to their parents that smoking is harmful and that continued use will cause death (Berger, 1988).

As young children enter the stage of formal operations (Piaget, 1972), their ability to analyse and evaluate a range of possible arguments and outcomes increases and this may cause a re-examination of previously accepted doctrine or beliefs. Many of the early decisions regarding non use of certain substances are reworked and re-evaluated resulting in the probability that an entirely different outcome can result. Values or beliefs that only a year ago were regarded as immutable are now questioned and reanalysed. There is an increase in critical awareness in early adolescence, but the individual's cognitive appraisal skills are still incomplete and there is difficulty in understanding the full implications of logical and hypothetical arguments that extend over an enlarged time frame. In situations where drug use or misuse can lead to problems that are not immediately apparent young adolescents fail to comprehend fully the

later consequences of such use. Johnston, O'Malley & Bachman, (1985) points out that the negative effects of some drugs take a long time before they become apparent to the user. Adolescents can appreciate the fact that tobacco use is harmful and a health risk, yet they find difficulty accepting that the long term effects of smoking could directly affect them.

2.2 The Possible Effects of Adolescent Egocentric Thinking on Susceptibility to Influence

As cognitive maturation continues the adolescent becomes increasingly aware of what others may be thinking. This increased ability to consider not only the possible beliefs held by others but the impact these perceptions have on the adolescent is a feature of adolescent egocentric thinking. The faultiness of adolescent egocentric reasoning regarding drug use can be appreciated in relation to both the `personal fable' and `the imaginary audience'. The personal fable refers to a form of adolescent egocentric thinking which permits intellectual acknowledgement of risk, but prevents the individual from giving assent to the fact that they could be personally effected. Complications arising from drug use will either not occur to them, or if they do then a sense of invincibility leads the adolescent to the conclusion that they can "handle it". Some degree of confusion or ambivalence may be created when young adolescents observe adults who smoke or drink, yet appear to be quite happy and healthy, despite the warnings of dire consequences. This perception, coupled with the misleading belief regarding personal invincibility, may make it very difficult for the adolescent to acknowledge that drug use can be harmful. Even when young people are told that the immediate effects of alcohol or marijuana use cause some degree of confusion and

slowed reaction time, problems are hard to identify and almost irrelevant if an individual believes in the personal fable of invincibility.

If young people are convinced of their personal uniqueness and hold the mistaken belief that they will not die or be harmed, then there is a lack of insight into potentially dangerous or harmful situations. Teenage girls may not bother to take contraceptive precautions, as they are convinced that although others fall pregnant, it will not happen to them. Reckless driving, or driving at high speed may be a consequence of believing in one`s unique capacity to `handle the situation'. Adolescents and young people, who drink alcohol or use marijuana, may similarly believe that their unique skills and abilities make them impervious to the deleterious effects that drugs have on driving skill, and so they place themselves in dangerous situations. The same internal logic can also support experimentation with other drugs, as the belief that one leads a charmed life reframes drug taking from an at risk activity, to just another experience that the young person wishes to participate in.

Adolescent egocentrism occurs because cognitive capabilities develop to the point where metacognitive thinking emerges. Young people are able to reflect on what others may be thinking about them and upon how they feel about the image that others hold. They can become very conscious of their developing profile and self image and this has its full expression in the creation of an imaginary audience who observe every action, word and detail of the adolescent's life (Elkind, 1967; Elkind & Bowen, 1979).

The adolescent believes that other people share the teenager's preoccupation with himself or herself and they may fantasize about how others may react to their appearance or behaviour. Egocentrism appears to peak at about age 13 (Elkind & Bowen, 1979; Grau & Hudson, 1984), although it may continue for several years before declining to the point that it is no longer an active influence on thinking or behaviour. Jones (1981), for example, points to an increase in adolescent egocentrism with rural lower class whites in America. Anolik (1981) presents data to suggest that delinquent boys are more concerned with the imaginary audience than non delinquent boys and Markstrom and Mullis (1986) suggest that increased concern about what others think is also present for mature individuals.

The debate regarding the stage at which the 'imaginary audience' begins to fade does not diminish the conclusions or possible implications that can be drawn from its undeniable existence. The construction of an "imaginary audience" can affect teenage beliefs and behaviour in many different situations. Berger (1988) points out that many teenagers can suffer anxiety about their physical appearance and "at times their thinking is so egocentric that a single blemish is enough to make then want to go into hiding" (p344). The perceived existence of an imaginary audience can become significantly intensified during social situations that could be regarded as stressful or threatening. One such situation could occur at a party where peers put pressure on an individual to drink or use drugs. Adolescents who wish to avoid embarassment and the experience of becoming the absolute focus of a peer group may attempt to minimise criticism or personal ridicule by blending in and copying the actions of peers. The

awareness of the 'imaginary audience' may be a factor in situations where young people submit to peer pressure.

2.3 Susceptibility to Peer Pressure and Conformity to Group Norms

Individuals can be influenced by their peers or significant others at some point in life, but increased susceptibility to peer pressure appears to be significantly greater in early adolescence than at other stages of life. Peer pressure may, of course, be relatively harmless and focus on adopting a certain type of hairstyle or wearing a particular brand of jeans, but it may easily become pressure to smoke, drink, or take risks. Some children may attach themselves to peer groups who refrain from potentially harmful risk taking activity. Other children may not be so lucky and become attached to a more `deviant' group in which risk taking and drug use is commonplace. Conformity to peer pressure may be related to the nature of the peer group and the child's motivation and understanding of social rules (Hartup, 1983). Abound (1981) gives the example of a child with low self esteem, who when compared to another child with high self esteem, will be more likely to conform to dubious or anti-social behaviour in order to win peer group approval.

The adolescents' desire to win social acceptance and approval is also noted by Kohlberg (1968) in research that examined the nature of moral development in children and adolescents. Kohlberg originally identified six stages of moral development. Almost 90% of adolescents aged 13-14 years are either at stage 2 or stage 3 (Colby, Kohlberg, Gibbs & Lieberman, 1983). The dominant motive of stage 2 moral development is being nice to others so that they will be nice to you.

The central concern in stage 3 is to be a good person, and to win the approval of significant others, despite the consequences of that behaviour. Kohlberg's research provides further empirical evidence to support the belief that young adolescents are preoccupied with gaining the approval of others; and this preoccupation can result in increased levels of susceptibility to peer influence and conformity.

Conformity to group norms emerges when children are only five or six and enter school for the first time. Before five years of age most children are too egocentric to be concerned about peer approval or pressure. Conformity differs across situational and contextual boundaries, but research by Berndt (1979) suggests that antisocial conformity increases from about third grade and reaches a peak at the ninth grade when children are about 14 - 15 years old. Antisocial conformity relates to the tendency of a child, following pressure or urging by peers to commit some form of antisocial act, which would probably be in conflict with parental expectations and attitudes.

Conformity to a new reference group may be assisted by the degree of adolescent egocentricism that has developed. The perceived existence of `an imaginary audience' and the subsequent heightening of self consciousness can direct the adolescent towards increased conformity with the peer group. During adolescence increased involvement with peers occurs, and if the adolescent is eager to attain social acceptance he or she becomes aware of the types of behaviours that will earn approval and facilitate popularity. It may be considered threatening or aversive to risk the disapproval of one's peers, who more concretely occupy the role of the imaginary audience.

2.4 Identity Formation and the Quest for Autonomy in Adolescence

In adolescence the peer group can become a critical agent of socialisation as dependence on the family is reduced and the young person seeks to find a more mature identity away from the control of parents. According to Erikson (1968), one of the most important tasks of adolescence is the development of a unique identity and sense of individuality. The development of a mature sense of identity is closely linked to the task of separation from adult control and the movement towards personal autonomy. Separation is a lifelong process, but the major foundation stones are laid down in adolescence. This process is again assisted by increasing cognitive maturation, which permits the adolescent to evaluate and rework a range of hitherto unquestioned beliefs and values into an emerging framework of independent thought. The emergence of adolescent egocentrism as a consequence of formal operational thinking has been criticised by a number of researchers (O'Connor & Nikolic, 1990; Pesce & Harding, 1986), who suggest that the source of adolescent egocentricism is in fact a consequence of the identity development process. Adolescents may confuse their own concerns and needs with those of others and become more egocentric because of the self concerns, social demands and novelty of making choices and defining an identity apart from parents, but in relation to their peers.

In the past the child has identified with parents, teachers, peers and with media or recording `heroes', and these personalities supply some of the fragments from which a unique personal identity can be built. The task of adolescence is to surrender the old immature and dependent ties of childhood identification to parents and others in

order to establish a more `adult' identity and mature status. According to Erikson (1968), the search for identity is the primary task and crisis of adolescence. If adolescents fail, then the negative outcome of adolescence is a state of aimlessness known as role confusion or role diffusion. Since adult status is the eventual goal of the young person, then characteristics or markers of adulthood are particularly appealing. Within a white Australian culture there are no clear `rites of passage'. Yet there are symbols of independence and adulthood which mark an individual as adult and mature. Adolescents observe adults in their community and conclude, quite logically, that drug use is one of the differences between children and adults (Berger 1988). Alcohol and tobacco use may be particularly appealing `markers' of adult identity and Brown, Bradford, Lohr & McClenahan (1986) remark that by late adolescence alcohol use is clearly more a mark of social acceptance than of deviance.

In the course of the young person's quest for a mature and adult identity autonomy becomes an important issue (Steinberg & Silverberg, 1986). The researchers note that as emotional autonomy decreased, and adolescents broke the ties of dependence between themselves and their parents, their ability to resist peer pressure declined. Adolescents who are still closely tied to their parents are least susceptible to peer pressure and take greater notice of parental values and injunctions. Adolescents who are less dependent on their parents are more likely to be influenced by peer pressure. Young adolescents have, in fact, traded one form of dependence, which in the initial instance is on their parents, for a second stage of dependence on their peers. Krosmick and Judd (1986) report that at sixth grade tobacco use appears more tied to parental mores and attitudes than to

peer influence. At the eighth grade however, the effect of parental attitudes and behaviours appears weaker than the example set by peers. The period of greatest peer influence appears to occur in early adolescence and conformity to antisocial peer pressure declines after ninth grade. By the age of sixteen and seventeen conformity to peer group attitudes and wishes declines and conventional adult standards and beliefs are more readily accepted (Berndt, 1979). Young people at this age begin to take greater control of their lives and become self reliant.These changes appear to be linked to the final stages in the young person's pursuit of autonomy.

2.5 Adolescents as Risk Takers.

The developmental characteristics of adolescence appear to predispose young people to greater risk.There is a fairly well documented body of evidence that identifies adolescents as risk takers (Hollinger, 1981; Jessor, 1983; McAnarney, 1979; Seiden & Freitas, 1980 and Tonkin, 1987). Vehicular crashes are responsible for the largest proportions of deaths for young people; and there is a growing awareness of the role that alcohol and other drugs play in road accidents and all forms of injury situations (Haberman & Baden, 1978, Simpson, Mayhew & Warren, 1982).

Many young people place themselves at risk because they misuse a particular drug. The most obvious example occurs within the context of a `night out' or party situation when the irresponsible use of alcohol can lead to `high risk' behaviour involving the use of motor vehicles. The realisation, that at any time inappropriate and irresponsible drug use can place young people at risk, has

implications for drug education. The emphasis on education programs which attempt to prevent addiction or dependency on illegal substances may be misplaced within an Australian setting, when statistics clearly reveal that the greatest risk to young people occurs in the form of `normal' adolescent alcohol use.

Adlaf and Smart (1983) concluded that there is a clear relationship between polydrug use and risk taking propensity. Wilde and Murdoch (1982), in a study of risk homeostasis applied to the problem of motor vehicle accidents, question if adolescent drivers are aware of the risks they take and raise the possibilty that the personal fable aspect of adolescent egocentric thinking may prevent them from perceiving the severity of a risky situation. According to Jessor (1983), adolescents engage in risk taking behaviours for a number of reasons. Risk taking may serve to express opposition to adult authority, to gain admission and identification with a peer group, to confirm personal identity, to take control, to affirm maturity and to mark transition into adulthood. Baumrind (1985) makes the point that some risk taking behaviour, which when viewed from an adult perspective may give rise for concern, is in fact a normal characteristic of adolescent development.

Each of the characteristics of adolescence may in isolation lead to an insignificant impact in the way a teenager behaves but when several of these characteristics combine there may be cause for concern. Table 2.1 identifies the characteristics which, when considered together, may predispose the adolescent towards greater susceptibility to harmful influences. During the period of adolescence the young person experiments with new and more independent roles

Table 2.1 The Developmental Characteristics of Adolescence which may Create a Period of Greater Susceptibility to Risk Taking Behaviours

Developmental Characteristics	Way in Which Characteristic is Expressed	Possible Impact on Drug/Alcohol Use
Greater cognitive ability (Piaget, 1972)	Ability to re-examine and challenge old values and attitudes yet still has difficulty in logical-hypothetical reasoning	Challenges old beliefs regarding non use of alcohol and other drugs yet has inability to perceive the implications and problems associated with use
Egocentric thinking (a) Personal fable (Elkind, 1967)	A belief in personal uniqueness which may lead to beliefs in invincibility - "It can happen to others but not to me"	Failure to appreciate the dangers associated with drug use and recognise that they could be harmed
(b) Imaginary audience (Elkind, 1967)	The belief that they are the focus of attention. Concern with what others may be thinking about them	Increased likelihood that negative peer influence can occur due to over-concern in meeting peer norms
Movement towards identity formation (Erikson, 1968)	Desire to develop a sense of self as distinct from parents and to also seek recognition and independence associated with adult status	The search for adult identity and the movement away from childhood creates increasing awareness of the characteristics of adult behaviour - including smoking, drinking or using other drugs
Movement towards autonomy (Steinberg & Silverberg, 1986)	Reducing dependency on parents yet replacing in the early stage with dependence on peers	Increased concern over acceptance by peers increases susceptibility to negative peer influence
Development of moral reasoning towards Stage 3 (Kohlberg, 1968)	Stage 3 reasoning is concerned with behaviour that pleases others - acceptance and approval by others is paramount	Greater likelihood of susceptibility to negative peer influence in order to win acceptance

and behaviours. If young people are placed in drug use situations in early adolescence when they neither have the skills nor experience to cope with stressful situations, then inappropriate drug use behaviour may occur. There is evidence from epidemiological studies (Baker, Homel, Flaherty & Trebilco, 1986; Blum, Blum & Garfield, 1976; Drew, 1981; Smart, Goodstadt, Adlaf, Shepphard & Chan, 1983) that drug problems are spreading. Young people are now taking a greater variety of psychoactive substances than their counterparts of 20 years ago, and they are using many of them more frequently. Kandel (1978) has demonstrated that nearly all drug use begins in the adolescent or pre adolescent years and it is rare for anyone to begin using a new drug after they are about twenty one years of age. In view of this situation and the characteristics associated with adolescent development young people may be more at risk than we have previously believed.

2.6 Developmental Characteristics of Adolescence and the Availability of Drugs May Create a Period of Increased Risk

The developmental characteristics of adolescence coupled with a setting or context in which alcohol, tobacco and a variety of other psychoactive substances are readily available creates the existence of a very real health risk to young people. The evidence regarding adolescent drug use strongly suggests that the onset of adolescent risk taking behaviours is "neither arbitrary nor fortuitous but is rather a systematic outcome of characteristics of the adolescent and of the adolescent's perceived environment that precede onset" (Tonkin, 1987, p. 216).

Bell (1968), writing about drug education and prevention in Australia over twenty years ago, made the point that prevention should occur at an early age; and in his opinion waiting until adolescence was too late, as drug taking may already be beginning. This injunction of over twenty years ago is even more relevant today. Drug use is now occurring at an earlier age than was formerly the case. Young adolescents appear to be at risk due to the characteristics of adolescence that predispose them to negative influence and faulty or immature thinking. It is of course true that the characteristics which have been previously discussed were present twenty years or more ago, but the emergence of a context in which drug use is occurring at an earlier age than was previously the case can only potentiate the problem and increase the level for potential harm.

Chapter Three: Factors Associated with Adolescent Use of Drugs

3.1 Adolescent Drug Use: Factors which May Predispose Young People to Use or Misuse Drugs

The developmental characteristics of adolescence outlined in the previous chapter suggest that all adolescents may be vulnerable to peer and social influences promoting the use of drugs, but it is clear that not all adolescents begin using drugs. This chapter examines a number of variables that have been correlated with drug use in adolescence. The identification of these variables is necessary if models of drug education, that have the potential to change adolescent drug use, are to be developed.

Drug use in adolescence is, like adolescence itself, a complex phenomenon. Beschner and Friedman (1985) point out that a variety of drugs, both legal and illegal, are available to many young people yet only a small percentage of adolescents become seriously involved. Adolescents use drugs for a number of reasons, and for many adolescents experimentation with a range of substances is closely linked to a rite of passage towards adulthood (Fieldman, Agar & Beschner, 1979). The vast majority of adolescent drug users fit into the category of recreational or situational users and they use a variety of substances in order to have fun and relax. It is important that a distinction is made between social or experimental users, who may use drugs infrequently or moderately to relax or have a good time, and those individuals who become addicted to one or more drugs.

Many of the inconsistent findings regarding aetiological and correlation factors associated with the drug use literature may be

linked to the fact that researchers often fail to distinguish between the various levels of regular use or misuse. If aetiological theory and research are to guide intervention and prevention programs it is necessary to specify clearly the nature of the target population and the prevention outcome goals. Different aetiologies may well exist for different categories of users.Patterns of drug use at different developmental stages may also have different aetiological origins (Kandel, 1982).

Although many variables can be identified as antecedent to, or correlated with drug use, important theoretical and conceptual questions regarding their precise effect on drug use have remained largely unanswered. The explanation of most phenomena usually begins with the collection of descriptive data, and subsequently moves towards attempts to unify evidence that has accumulated into a more coherent and substantive account. The emphasis in adolescent drug use research has moved from retrospective study of drug use in already addicted populations towards epidemiological studies of the correlates of adolescent drug use (Murray & Perry, 1985). Numerous cross-sectional and longitudinal studies have produced a considerable amount of information on the antecedents and correlates of adolescent drug use (Adler & Lotecka, 1973; Blum, 1969; Dull & Williams 1981; Fors & Rojeck, 1983; Grady, Gersick, Snow & Kesser, 1986; Johnson, 1980; Kandel, 1982; Kandel, Kessler and Margulies, 1978; Jessor & Jessor, 1975). Much of this research has sought to identify risk factors and specific traits which could predispose or cause subsequent drug use. Jones and Battjes (1985) point out that these risk factors may not be consistent across groups, and are probably

influenced by social and economic conditions as well as historical factors.

3.2 The Correlates of Adolescent Drug Use: Antisocial or Deviant Behaviour in Childhood

Adolescent substance use has been shown to be associated with antisocial and deviant behaviour (Barnes & Welke, 1986; Johnson, O'Malley & Everlard, 1978; Kandel, Kessler & Marguilies, 1978; Robins, 1978; White, Johnson & Horwitz, 1986). Attitudes and beliefs, which show a high tolerance for deviance and non-conformity to traditional values and societal norms, are also linked to drug-using adolescents (Brook, Linkoff & Whiteman, 1977; Goldstein & Sappington, 1977; Gorsuch & Butler, 1976; Lettieri, 1978; Hirschi, 1969; Jessor & Jessor, 1977; Paton & Kandal, 1978). The association between drug use and antisocial behaviour is not simple and may vary over different developmental stages. Antisocial behaviour in early adolescence appears to be a more powerful predictor of later drug misuse problems than the existence of antisocial behaviour in early childhood (McCord, 1981). Less than half of children who exhibit signs of serious conduct problems will continue into adolescence and young adulthood with these problems (Loeber & Dishion, 1983; Robins 1978). Hawkins, Lishner and Catalano (1985) believe that the evidence of a positive relationship between childhood antisocial behaviour and subsequent drug use is relatively constant, although there are risks of 'false positives' occurring in relation to predicting subsequent drug misuse. One factor that has been consistently correlated with subsequent drug use however,is a disposition towards rebellion, independence and non conformity (Polich, Ellickson, Reuter & Kahan, 1984).

A number of studies (Alder & Lotecka, 1973; Baumrind, 1985; Brook, Linkoff & Whiteman,1977; Jessor & Jessor, 1977; Kandel, 1982; Loeber & Dishion,1983; Tec, 1974) indicate that deviant behaviour and drug use are more likely to occur in families where relationships are poor, inconsistent parental discipline is applied and disturbed patterns of family management occur. Where parents are unconventional and do not apply sanctions against inappropriate drug use behaviour, early initiation into drug use may occur.A number of studies have also shown that early initiation into substance use is significantly correlated with later drug abuse problems (Kandel, 1976; Kaplan, Johnson & Bailey, 1984; Robins & Przbeck, 1985). Baumrind (1985) states that "the most ubiquitous finding in the adolescent substance abuse literature is that a traditional, conservative upbringing shields youngsters from early exposure to illicit drugs "(p 35).

Research findings suggest that adolescents are less inclined towards delinquency and the inappropriate use of drugs when they are committed to the work ethic, to school achievement, to conforming with traditional values and hold religious beliefs (Agnew, 1984; Albrecht, Chadwick and Alcorn, 1977; Hirschi, 1969; Kandel et al., 1978; Robins, 1980; Smith & Fogg, 1978; Svobodny, 1982; Turner & Willis, 1984). These values are generally fostered by parents. Simons, Conger and Whitbeck (1988) argue that young people who lack a commitment to future values would place more emphasis on immediate, hedonistic pursuits. It is likely that these individuals would be attracted by deviant peer groups which tend to emphasise sensation seeking and immediate gratification. The transmission of

positive values appears linked to effective parenting practices in terms of affection, mutuality, communication and concern. Simons et al., (1988) suggest that where the parent-child relationship is poor, and parental mismanagement has also occurred, the adolescent is more likely to commit himself or herself to the peer group; and the parent's ability to influence the choice of friends will be significantly decreased.

3.3 The Relationship Between Personality Factors and Adolescent Drug Use

The importance of personality factors in explaining drug use has received varying degrees of empirical support, depending on the nature of the variables under investigation and the kind of drug use or abuse being examined. Some studies do indicate that psychological disturbances may predate adolescent drug use; and traits such as rebelliousness, alienation, anxiety, depression, delinquency and conduct disorders have been cited as possible indicators of underlying drug related psychopathology (Beschner & Friedman, 1985; Carroll, 1981; Kellan, Brown, Rubin & Ensminger, 1983; Shedler & Block, 1990). Orgive and Gerard (1980), on the other hand, examined a range of personality and attitudinal correlates of drug use and concluded that personality factors fared poorly in distinguishing users from non users.

Problems of psychopathology or emotional disturbance are related to many other factors. Social learning theory (Bandura, 1977) suggests than an individual's self concept is linked to the levels of acceptance and rejection experienced at home, with peers and at school. A longitudinal study by Kaplan, Johnson & Bailey (1986) found that psychological distress at the time of initiation into

substance use predicted an escalation of that use in adolescents. Substance use may also be influenced by limited personal coping and social skills (Marlatt, 1979; Wills & Shiffman, 1985). Drinking alcohol or using drugs may be seen as a means of coping with stress among individuals who have a limited range of coping skills (Pentz, 1985; Wills, 1985). Studies with both adults and adolescents suggest that stress, anxiety and depression are related to substance abuse (Alterman, 1985; Robins & Przbeck 1985).

Low self esteem has been cited as a predictor of adolescent drug use by some researchers (Ahlgren & Norem-Hebeisen, 1979; Smith & Fogg, 1975), but other research tends to suggest that the link between self-esteem and drug use is far from clear (Donovan & Jessor, 1983; Hays, 1980; Jessor & Jessor, 1978; Kaplan, 1978 a,b). Ahlgren, Norem, Hochhauser and Garvin (1982) examined the antecedents of smoking amongst pre-adolescents and concluded that self esteem does not appear to predict adolescent smoking. Hays et al (1986) conclude that variables such as self esteem and alienation may appear to predict drug use in some studies, but these findings may be shown to be misleading when such variables are included in a multivariate model.

In Australia a number of educational programs adopted self esteem based approaches to drug prevention, but they failed to distinguish between substance use and pathological use. Low self esteem may well be related to drug abusing populations who have established high levels of deviance and hard core addiction. It is important however, to recognise the difference between finding a correlation between serious substance abuse involving high levels of

addiction, and assuming that this factor is causally linked to initiation. Some researchers argue that traits observed in drug dependent individuals are more a result of their drug taking than a pre-existing variable that creates a predisposition towards subsequent drug misuse (Bejerot, 1977; Blum, 1979; Lennings, 1981; Zarcone, 1980). Powell (1982) comments that, in order to achieve the addict role, the individual must build an identity of a "junkie", and the skills and characteristics of the drug subculture are acquired through observation and necessity.

Baumrind (1985) examined the antecedents of adolescent drug use and concluded that there was no suggestion, in her data, that the early interpersonal coping strategies of adolescent substance users was deficient. The aetiology of pathological drug use appears to extend beyond the normal risk taking behaviour that characterises adolescence. Characteristics such as antisocial aggression or psychopathology may be linked to some delinquent adolescents and to the onset of substance use, but for the majority of drug users a deficiency or deviancy hypothesis is not supported.

One of the personality variables which has consistently been linked to drug taking behaviour is sensation seeking (Segal, Huba & Singer, 1980; Zuckerman, 1979). Hobfall and Segal (1983) believe that sensation seekers have a greater need for increased stimulation and in consequence takes drugs to satisfy that need. Johnston, O'Malley and Bachman (1986) collated information from nine surveys that examined why students chose to use drugs and alcohol. The most common reasons mentioned were to have a good time, to experiment, to feel good, to get high or to relieve boredom. Other reasons less

commonly cited included the relief of tension, relaxation and to escape from problems or troubles. These findings suggest that although personality factors or concerns regarding stress are mentioned, the majority of responses indicate that adolescent drug use appears to be unrelated to personality or psychological factors. The relationship between personality characteristics and drug use is far from clear. In general, research into adolescent drug use has failed to provide sufficient evidence to support the view that personality factors can distinguish typical adolescent drug users from non-drug users.

3.4 Social Learning Influences on Adolescent Drug Use

There is evidence from a number of studies that children and adolescents are more likely to engage in various forms of drug use if their parents display a pattern of regular tobacco, alcohol and other drug use (Bushing & Bromley, 1975; Flay, Hanson, Johnson & Sobel, 1983; Kandel et al., 1978; Liccione, 1980; Nolte, Smith & O'Rourke, 1983; Smart & Fejer, 1972). The acquisition of patterns of behaviour similar to that of parents, peers and significant others, through a process of modelling and reinforcement, would be entirely consistent with social learning theory expectations (Bandura, 1977). The probability that a child indicates an intention to smoke at some time in the future doubles if one parent smokes (Ahmed, Bush, Davidson, & Ianotti, 1984). This probability could quadruple if the smoking parent's attitude to tobacco use was considered supportive (Nolte, et al., 1983). A significant correlation exists between the early onset of drug use and introduction to drugs by adults rather than peers, although there are age and drug differences relative to levels of influence by parents and peers (Baumrind, 1985).

Substantial research evidence exists which indicates that peers influence substance use (Brook, Whiteman & Gordon, 1983; Evans, Rozelle, Mittlemark, Hanson, Bane & Hovis, 1978; Huba, Wingard & Bentler, 1979; Jessor & Jessor, 1977; Johnson, 1973; Kandel, 1978; McAlister, Perry, Killen, Slinkard & Maccoby, 1980). The belief that friends or peers approve of drug use has been identified as one of the strongest predictors of self-reported drug use (Ahmed et al., 1984; Jessor & Jessor, 1978). Values and behaviour patterns of youth tend, over time, to reflect those of their friends (Hartup, 1983) and there is considerable evidence to suggest that association with drug using friends is possibly the most powerful predictor of substance use (Kandel, 1978; Jessor & Jessor, 1977; Oetting & Beauvais, 1985, 1987). Underlying psychosocial factors may in fact create the potential for drug use:

> "But these factors only set the stage. The single dominant variable in adolescent drug use is the influence provided by the peers with whom an adolescent chooses to associate. We believe that drug use is nearly always directly linked to peer relationship." (Oetting & Beauvais, 1987, p. 206).

Whilst the family may emerge as a primary influence shaping drinking behaviour, the peer group has been shown to be an important socialising agent in providing opportunities and settings for alcohol (or drug) use (Barnes, 1981). Liccione (1980), in a study of the relative influence of significant others on adolescent drinkers, concludes that the group of people adolescents refer to as their "friends" exert a stronger more pervasive influence on their drinking than any other group examined (including parents). The influence of peers on adolescent initiation into tobacco use and marijuana use appears to be significant. Use of marijuana is more closely linked to an orientation towards peers as opposed to parents. Marijuana use is

also supported by the perception that one's peers appear to view this behaviour as favourable (Jessor & Jessor, 1978; Penning & Barnes, 1982). Most researchers, however, are loath to select the prominence of one variable over all others in determining the precise nature of the mechanisms underlying cigarette smoking (Pederson & Lefcoe, 1982, 1985).

Kandel, Kessler and Margulies (1978) recognise that both parents and peers are influential in determining the extent to which a young person may become involved in drug use. Effective parental bonding and values transmission may well be a mediating factor which can either restrict or empower the peer group's influence on an adolescent (Krohn, Massey, Laner, & Skinner, 1983). Adolescents will tend to form friendships with individuals who have similar values to their own. Where early substance use occurs experimenters might be expected to drift into deviant peer groups which accept and reinforce such behaviour. The movement from the family environment towards the peer group is part of the normal process of adolescent identity formation. As the individual moves deeper into adolescence the influence of families on drug taking behaviour appears to decrease in relation to the influence exerted by peers. The strength of the association between substance use and association with friends may depend on several different factors, including which drug is to be examined, the perception of substance use by others and the setting or environment.

One feature of the environment that has been identified as a possible influence on young people is the advertising media. Concern has been expressed regarding the advertising of alcohol, tobacco and

"over the counter medication". The problem of drug abuse stemming from both the prescription pads of doctors and from self prescribed medication is a significant problem (Frederick & Guldbransen, 1976; Milgram, 1982; Wotring, Heold, Carpenter & Schmeling, 1979; Wyndham, 1981). Pharmaceutical advertising may have resulted in the belief that we need not accept discomfort of any level, or at any time. If children grow up believing that there is a drug to ease every problem, then far reaching implications may result, and drugs may be regarded as the only acceptable solution to pain, stress, anxiety and other human conditions.

3.5 The Limitations of Correlational Research

A wealth of evidence has emerged from numerous correlational studies which permit identification of a number of factors that appear to be related to drug use (Table 3.1). Shore (1985) comments on the fact that although there is a tremendous wealth of correlations linked to drug use " one is struck by the inability to gain any organised conceptual answer" (p. 132). Shore also points out that in many studies different labels are applied to like or similar phenomenom; and this creates some degree of confusion in progressing towards an organised conceptual theory related to the aetiology of drug use. This problem is nowhere more clearly illustrated than in the numerous correlational studies that have attempted to associate a similar group of independent variables with a changing dependent variable. Some studies focussed on typical drug use whilst others examined various levels of drug abuse leading to addiction.

Table 3.1 The Correlates of Adolescent Drug Use and Misuse

Strong Association	Moderate Strength of Association	Low or Inconsistent Association
Association with drug using friends		Personality factors such as: low self esteem anxiety depression
Parent modelling of drug use		
Antisocial or deviant behaviour		Media images or media pressure
	Tolerance of deviancy and attitudes that reject normal school and social values, and work ethic. (Alienation from accepted norms.)	
	Early (atypical) entry into drug using behaviour Belief that peers use drugs or approve of drug use Sensation seeking and drug effect seeking motives Inconsistent or disturbed family upbringing Unconventional or non traditional values and upbringing	

Note: The fact that varying degrees of support are obtained for each of these variables may be linked to the differing sets of criteria chosen for comparison, eg., drug use, drug abuse (etc.)

Many early drug education and prevention programs based their curricula on the results of correlational studies conducted on addict populations. These studies indicated that illegal drug users were deficient in a number of social skills and lacked self esteem. Research findings were incorporated into prevention programs and children were trained in communication skills or given self-esteem exercises in the belief that drug misuse would be prevented. However many ordinary adolescents and young adults, who are not deficit in self-esteem or communication skills, or who cannot be described as addicts, may still place themselves at considerable risk if they choose to drink and drive or accept a lift from a friend who has used alcohol or smoked marijuana. The responsible and legitimate recreational user of drugs is entirely different from a drug addict whose whole lifestyle revolves around the procurement and use of drugs. Considerable caution must therefore be observed in attempting to

generalise findings from specific populations of drug users and applying these findings to other populations of drug users.

3.6 The Need to Move Beyond Correlational Research Towards Conceptual Models of Adolescent Drug Use

In the past drug education research has been criticised for its lack of theoretical sophistication and a failure to examine the available drug abuse literature. Drug education in the late 60's and early 70's was based largely on intuitive notions.As these early endeavours failed drug educators began to examine a developing body of aetiological research on drug abuse. Most of the literature was correlational in nature, and although programs appeared to be more adequately supported by a research base, results were still not overly encouraging. Because of the problems inherent in specifying the exact nature of the phenomena being studied, a variety of variables were identified as associated with drug use (see table 3.1). Many of the variables identified as significantly correlated to drug use might, however, only explain a very small proportion of the variance when used in a multivariate or complex model. In order to develop theories which have the potential to explain adolescent substance use and abuse an interactional multivariate framework needs to be examined.

If drug education is to move beyond simple univariate explanations and mere 'correlational' evidence towards a fuller, more substantial understanding and description of drug misuse in adolescence then research must begin to identify probable models or theories which can explain a wider picture. During the past few years a number of drug use theories, designed to account for adolescent initiation into drug use, have begun to emerge. The next chapter

examines the relevance of these theories to adolescent drug use in order to provide a conceptual framework from which to develop a model of drug education.

Chapter Four: Theories of Drug Abuse

4.1 Theories of Drug Abuse: How Relevant Are They to Adolescent Initiation into Drug Use?

There is strong evidence to support many of the findings mentioned in the previous chapter, but until fairly recently these findings have not been integrated into theoretical models. Drug education programs have developed in a similar manner. As new correlational findings emerged from the literature on drug use, new educational programs based on the latest findings emerged. Many programs were essentially a mixed bag of approaches that appear to be related to substance use yet are not interelated coherently. Research into the causes of drug and alcohol abuse has so far focussed primarily on obtaining a description of the phenomenon. Description normally precedes the development of theory or model building which attempts to explain the phenomenon (Bentler (1978). Whilst it may be some time before a fully integrated and comprehensive theory of drug abuse based on empirically derived foundations is established (if ever) there have been a number of recent advances in the development of theories concerned with substance use.

An analysis of the literature concerned with the aetiolology of drug abuse suggests that at least four loosely defined theoretical groupings are needed in order to accommodate the full range of theoretical positions (Figure 4.1). The four categories defined include a biogenetic or drug effect group, a socialisation group, a psychological group and a psychosocial group. Some theories are positioned across more than one boundary in order to accommodate different perspectives.

Biogenetic/Drug Effect Theories	Socialisation Theories	Psychosocial Theories	Psychological/Personality Theories
Vulnerability Acceptance Theory (Jellinek, 1960)	Social Learning Theory (Akers, 1979; Bandura, 1977)	Problem Behaviour Theory (Jessor & Jessor, 1977)	Self Esteem Theory of Drug Abuse (Steffenhagen, 1974)
Genes Susceptibility Hypothesis (Vaillant, 1983; Goodwin,1985)	Subculture Theory (Johnson, 1973; Kandel, 1978)	Domain Theory (Huba, Wingard & Bentler, 1980)	Ego/Self Theory of Substance Dependence (Khantzian, 1978)
Biological and Social Psychological Theory (Berjerot, 1980)	* Social Control Theory (Hirschi, 1969)	Peer Association Theory (Oetting & Beauvais, 1986)	
Reinforcement and combination of Effects (McAuliffe & Gordon, 1979)	* Differential Association Theory (Conger, 1956; Hinderlang, 1973; Sutherland, 1947)	Social Development Model (Weiss & Hawkins, 1981)	Self Esteem and Self Derogation Theory (Kaplan, 1979)
	* Strain Theories (Dohrenwend & Dohrenwend, 1981)		Availability - Pronenness Theory (Smart, 1977, 1980)
	Flay's Developmental Smoking Model (Flay, 1985)		
Biobehavioural Model (Pomerleau & Pomerleau, 1987)	Developmental Stages Theory (Kandel et al., 1978)		
Tendency towards simple univariate explanations	More complex multivariate explanations		Tendency towards simple univariate explanations

Figure 4.1 Theoretical Models Attempting to Explain Initiation into Drug Use and Abuse

Theories that are located at either end of the framework tend to be more tied to a single theoretical position or unitary explanation regarding drug use whereas theories closer to the middle tend to integrate a number of characteristics or approaches into a more complex explanation of the causes of drug misuse.

4.2 Psychological and Personality Theories of Drug Use

Theories of drug abuse which emphasise psychological or personality factors have had a long, if not particularly illuminating, history. Psychological theories tend to regard drug use as meeting personal needs or compensating for personality deficiencies. The conceptual basis for the personality approach stems from Freudian psychodynamic theory. This perspective suggests that the problem is located in individual and personality deficiencies which create a predisposition towards drug use. The specific action of the drug either provides need gratification or obliterates mental anguish (Kaufman, 1974; Khantzian, 1980; Gold, 1980). From a psychoanalytical point of view drug users were considered to be dependent, orally fixated and narcissitic (Kaufman, 1974) and attempts were made to empirically identify an addictive personality. Because various clusters of personality characteristics could not be identified with any consistency such an approach proved to be untenable. A number of researchers (Khantzian, 1978; Steffenhagen, 1974) have, however, proposed personality theories.

Khantzian (1978) proposes an ego/self theory of substance dependence which views drug use from a contemporary psychoanalytic perspective. Khantzian regards the problem of

substance abuse as a result of severe ego impairments and disturbances in the 'sense of self' which then predispose individuals towards addiction. The 'sense of self' is also emphasised in the self esteem theory of drug abuse (Steffenhagen 1974). Individuals strive for security, superiority and success within a goal oriented society. A failure to master situations and achieve goals can result in a negative self assessment and low self esteem. A lack of self esteem, of itself, may not be a necessary condition for initiation into drug abuse but it predisposes the individual. Although Steffenhagen (1974) recognises the influence of peer pressure, availability and social influences, low self esteem is postulated as the underlying psychodynamic factor determining drug abuse.

A self esteem and self derogation theory is proposed by Kaplan (1979, 1984). Peer rejection, alienation at school, failure to live up to parental expectations, parent neglect, impaired sexual, physical or social identity and low coping abilities are some of the variables that can trigger self rejection and lowered self esteem. As a consequence of experiencing intense self derogation the individual may in turn reject individuals and institutional values that are seen as critical and negative. The individual may then seek out an alternative peer group (more similar and therefore more deviant) in order to gain acceptance and reduce the past experiences of criticism and rejection. Self esteem which was previously unachievable in the past with a traditional peer group is enhanced in the new peer setting, thereby decreasing self-derogation. Kaplan (1984, 1986) pointed out, however, that the theory applied only to populations in which a particular drug use pattern was regarded as deviant. It does not apply to drug use which is uniformly adopted and approved of.

The 'availability-proneness theory' of drug abuse proposed by Smart (1977, 1980) essentially suggests that when a prone individual is exposed to high levels of availability drug use will occur. Smart (1980) recognises the similarities between his theory and that of Jellinek's (1960) vulnerability-acceptance theory of alcoholism and comments on the fact than in many ghetto situations in the United States where drugs are freely available addiction rates are high. The concept of proneness refers to personality traits which presumably predispose individuals to addiction and from this perspective drug abuse is seen as a coping mechanism for dealing with psychological problems.

4.3 The Relevance of the Psychological Theories to Adolescent Drug Use

In general the psychological theories of drug abuse assert that drug abusing individuals possess a number of personality deficits. These deficits exist prior to drug use and they create a vulnerable individual who is either predisposed towards drug use and deviance, or who uses drugs in order to cope with psychological problems. One of the main arguments levelled at these theories is that the personality disturbances observed in some drug abusers might be the result rather than the cause of their drug abuse. Much of the evidence has come from post-hoc analyses and from studies of current abusing populations rather than longitudinal studies beginning in adolescence. A number of studies have provided information about the relationship between psychological characteristics and drug use but these findings are equivocal. Some studies are able to demonstrate a pre-existing level of deviancy (Block, Block & Keynes, 1986; Brook,

Whiteman, Gordon & Cohen, 1986; Kellam, Ensminger & Simon, 1980; Shedler & Block, 1990) whereas others either remain unconvinced or add a number of other significant variables into the equation (Baumrind, 1985; Bejerot, 1977; Jessor and Jessor, 1977; Kandel, 1980). These inconsistencies are further highlighted by the fact that many individuals with personality problems do not abuse drugs. Another inconsistency which creates further objection to personality theories comes from the fact that many individuals who use drugs do not have any major psychopathology (Newcomb & Bentler, 1988; Reuband, 1977)).

Krivaneck (1982) makes the point that the question of "whether drug addicts really do use drugs as a crutch to cope with the stresses of life has begun to be formally tested only recently, and the results suggest that a major reorientation is needed"(p.90). Newcombe and Bentler (1988) suggest that experimental use of a range of drugs is part of the teenagers quest for establishing an independent identity, and it is therefore normative behaviour amongst adolescents. Univariate conceptualisations such as Kaplan's self-derogation theory may well be appealing because of the simplicity of the argument; but such explanations can only account for a very small part of the variance in drug use when a multivariate analysis is conducted (Oetting & Beauvais, 1987). However, for at least some individuals, maladjustment precedes initiation into drug use, and in consequence psychological factors cannot be ruled out; but they would appear to play a much more minor role than was previously believed to be the case. Their role in explaining typical adolescent initiation into drug use is questionable. Because of the rapid expansion of drug use into the general population, evidence regarding the association between

psychopathology and chronic addiction to illegal drugs may be out of place.

The emphasis in drug use research has moved away from a study of drug abuse in clinical populations towards the study of the causes of adolescent drug use in normal populations. The major drugs that can cause death and disability in the community are the legal drugs. For the vast majority of adolescent drug users and experimenters a personality deficit hypothesis or a symptom relief explanation is untenable. This conclusion does not deny the fact that, in any given population, a number of individuals with serious maladjustment and personality disorders may be identified. These individuals may well need special programs that are different to those developed for the vast majority of young drug users who place themselves at risk.

4.4 The Relevance of the Biogenetic Theories to Adolescent Drug Use

A number of theories emphasise the effect of drugs, either in relation to a genetic predisposition or a physiological adaptation model. The observation that vulnerability to develop a given disease is not equally distributed among individuals (eg. influenza, diabeties) can lead to the proposition that individuals differ in terms of an inherited predisposition. The vast bulk of research into the possibility of a genetically transmitted predisposition to addiction refers to alcohol abuse (Goodwin, 1979; Schuckit, 1984; Tarter, Alterman & Edwards 1985a). There is suggestion, however, that addictive tendencies for other drugs also exists (Dupont, 1984; Snyder, 1977). The presumed predisposition to alcohol has led to a reformulation of

alcoholism as a 'disease' (Jellinek, 1960) which affects vulnerable individuals either because of genetic factors or due to psychological damage occurring in childhood, or both (Alexander, 1987).

A contemporary reformulation of the biogenetic theories incorporates the role of psychological and social variables as important mediators between genetic susceptibility and behaviour (Alexander, 1987; Goodwin, 1979; Vaillant, 1983). Research has also focussed on the relationship between the reinforcing properties of the drugs used and an individual's biological response (Pomerleau and Pomerleau, 1987). These drug effect theories view addiction as essentially a compelling involvement in a behaviour that modifies the "internal milieu" in such a way as to produce immediate reinforcement. Pomerleau and Pomerleau, for example conclude that a significant factor which explains the maintenance of smoking (and other drugs) is the need to escape or avoid the aversive consequences of withdrawal. Although pharmacology and dependence are clearly important factors many drugs are taken within the context of both classical conditioning theories and social learning theories. Factors such as enhancement of pleasure, relaxation, peer reinforcement, etc, all maintain the desire for drugs. Models which focus on the relationship between an individual's biological responses and the nature of the drugs used have departed from a pure biogenetic formulation to a classical learning theory framework (eg., McAuliffe & Gordon's (1979) Reinforcement Theory) where levels of negative and positive reinforcement determine the nature of use.

4.5 Evaluation of the Biogenetic or Drug Effect theories

Peele (1985,1986) cites considerable evidence to indicate the problem that defining addiction in a purely biological or physiological manner produces. Perhaps the most convincing evidence for the role of a biobehavioural or pharmacological explanation of drug use occurs at a maintenance level. Use is maintained by a combination of positive reinforcements, which include euphoric relaxing effects, and by negative reinforcements associated with avoidance of withdrawal effects.

Pharmacological theories offer no explanation regarding initiation into drug use however. The question regarding why adolescents begin using drugs requires a non pharmocological or non physiological explanation. Drug effect theories also fail to explain why only a small proportion of the drug using population becomes addicted when many adolescents and young people try drugs and experience a range of positively reinforcing feelings. Because many drugs are not physiologically addictive, and others do not lead to increased tolerance or withdrawal responses (Bejerot, 1980), pharmacological theories cannot account for drug use without invoking other explanations. Krivaneck (1982) points to the fact that many drug users who have been withdrawn from drugs leave hospital with no physical dependence remaining, yet they immediately return to drug use upon their discharge. Equally problematic is the fact that many individuals who apply for treatment at narcotic addiction centres do not appear to be physically addicted to drugs (O'Brien, 1974). Social and environmental factors are more heavily implicated in many aspects of drug use as the research of Robins, Helzer and Davis

(1975) suggests. Robins investigated the levels of heroin addiction in soldiers prior to, during and following a tour of duty in Vietnam. In Vietnam approximately 20% were physically dependent on heroin, but in less than one year after returning to America drug use dropped to a level of below one percent, which was the same as their pre-Vietnam usage level. Robins et al (1975) concludes that the study demonstrates the effect of "setting" rather than natural predisposition.

The genetic predisposition and biological theories do not, on their own, offer a sufficiently well developed explanation of the causes of substance abuse. The inclusion of other variables such as the reinforcing properties of the drugs used, as well as psychological or social factors all suggest that these theories fail to offer an adequate framework from which to understand drug use. In particular the biogenetic and the drug effect or pharmacological theories do not offer a reasonable explanation for adolescent initiation into drug use. Tarter and Edwards (1987) argue that if a genetic susceptibility does exist it still must be shaped by environmental forces and neither the biogenetic or bio-behavioural theories can explain initiation into drug use without focussing on a range of other factors.

4.6 The Relevance of Socialisation Theories to Adolescent Drug Use

Most societies support or condone a wide variety of drug using behaviours, and socialisation theories focus on how features of the social structure, external to an individual, produce patterns of drug use behaviour. The individual is seen as embedded in a matrix of social relationships and responsive to a range of social influences.

According to social learning theories (Bandura, 1977) drug use is regarded as a learned behaviour that occurs within a social context.

Two processes are central to a social learning explanation of adolescent socialisation into drug use. Initially adolescents learn behaviour through observing the modelling activities of significant adults and peers. Once behaviour is initiated it needs to be reinforced by the approval of these significant others. In addition to these external determinants of behaviour a number of internal factors including cognitive information processing variables, personal norms, performance standards and motivation interact with external determinants to encourage drug use. Association with drug using peers during adolescence and modelling of drug use behaviour by parents, are two of the strongest predictors of drug use.

4.7 Subculture and Social Strain Explanations of Drug Abuse

Drug subculture explanations draw upon social learning theories in viewing drug use as a learned behaviour occurring within a distinct social context (Johnson, 1973, 1980). Drug subculture theories do not primarily focus on the concept of abuse, dependency or addiction but interpret behaviour in terms of norms, values, roles and role behaviour linked to a specific group. The adolescent or young person is once again seen as embedded within a social context which encourages and reinforces drug use. Johnson originally suggested that American drug using subcultures existed in specific ghetto or racial settings in American cities. Subcultures which exist as racial or ghetto groupings may be generally viewed as outside the experience of Australian drug users, although the severe problems associated with

alcohol abuse or petrol sniffing that occurs within some black Australian communities would tend to refute this belief.

Strain theories were originally developed in order to account for adolescent deviance, but they have been applied to substance abuse. Strain theory suggests that individuals engage in deviance because society is unable to satisfy their fundamental needs and they may therefore use drugs in order to cope with the stress of high unemployment, lack of educational opportunity or relevance, and the feeling that legitimate opportunities for success are unavailable. Dohrenwend and Dohrenwend (1981) view various forms of deviance, such as substance abuse, as mechanisms that permit individuals to cope with the stresses of life under such conditions. When drug use was identified as occurring in predominately black ghetto settings in America, social theorists regarded this form of drug use as a result of acculturation stress in minorities. Now that drug use is a widely spread phenomenon, such social strain theories tend to have fallen out of favour; however aboriginal alcohol abuse may still fit this model. White values and cultural expectations predominate and aborigines experience a breakdown in their own culture and varying degrees of alienation from the European structure and norms of white Australia. White, Johnson and Horwitz (1986) concluded that strain theories failed to predict or explain drug and alcohol abuse to any significant amount amongst a representative sample of adolescents.

4.8 Control and Differential Association Theories and their Applications to Adolescent Drug Use

Control theory (Hirschi, 1969) examines the degree of social bonding between adolescents and conventional social groupings such

as families, schools and other social institutions. Originally the theory focussed on delinquency, but it has since been applied to an examination of drug use (White et al., 1986). It was argued that individuals who feel a lack of attachment to conventional groups would tend to reject normal social conventions, and in consequence seek to violate such rules and norms and become involved with drug using groups. Hirschi (1969) notes that individuals who engaged in smoking or drinking whilst still at school appeared to have less commitment to the educational system. An investigation of the relationship between control theory and drug use by Dull (1984) pointéd to a positive correlation between drug use and reduced social bonding, but the results proved to be relatively weak and of little explanatory value. These findings are also substantiated by White et al (1986), who examined the relationship between three social deviance theories and drug use, and concluded that whereas strain and control theories appeared to have little relevance to drug use, differential association theory appeared to explain and predict some drug use.

The early literature investigated aspects of differential association related to criminal behaviour (Sutherland, 1947). Like other deviance theories interpretations have subsequently been redirected towards an explanation of substance abuse. Differential association theory basically suggests that interaction with individuals engaged in deviant behaviour, or with those who hold beliefs or attitudes which suggest a propensity to engage in deviant behaviour, will establish similar beliefs, attitudes and behaviours. Adolescents and young people will participate in acts society defines as deviant because of the values of their reference group and not because of any underlying pathology. If, upon joining a particular group, non

participation or non compliance with the group's activities occurs, the non conforming member will be perceived negatively. Where the values of membership in one group conflict with the values of a group that is perceived as more important, a non conforming member will engage in deviant actions supported by the more significant group in order to gain acceptance. Association with groups or individuals who engage in illegal drug use and who reinforce violation of established normative behaviour will, in consequence, tend to support greater involvement with drug use.

Research by a number of investigators indicates that the strongest predictor of substance use, including illegal drug use, is association with peers who use drugs (Kandel, 1978; Jessor & Jessor 1977; Napier, Goe & Bachtel, 1986; White et al, 1986).

4.9 A Stage Theory of Progression into Substance Use Within an Interactive Social Framework

Theories that attempt to explain social deviance do not generally explore age differences or examine the various aspects of each model within a developmental context. Several researchers have identified a progression or sequence of increasing drug involvement in which a range of different social factors appear to play a particular role (Kandel, 1975; Kandel, Kessler & Margulies, 1978; Hamberg, Braemer & Jahnke, 1975). Kandel (1978) examined the significance of parents, peers and other aspects of the social environment correlated with drug taking behaviour in relation to a stage theory of drug use. Four stages of progression appear to exist, with beer and wine becoming the first substances to be used by young people. This was followed by tobacco and 'hard' liquor, then by marijuana use, and finally by other illegal

substances. Some degree of controversy exists, according to Kandel (1980), about "whether the notion of stages implies that development must necessarily occur in a hierarchical and fixed order, as Piaget, for example proposes" (p.127). Kandel and Yamaguchi (1985) stress the importance of not attributing universality to their theory as the use of a drug at any particular stage does not invariably lead to progression through the sequence; and there are individuals (although a small minority) who appear to bypass whole stages. It is not therefore a reformulation of a stepping stone theory or even as some might suggest a 'gateway' leading to further experimentation or use, but it is generally true that "the use of a drug lower in a sequence is a necessary but not a sufficient condition for progression to a higher stage." (p.121).

In each of the four stages a number of social learning factors appear to differentially account for drug use. Association with peers who use marijuana, as well as adoption of attitudes and beliefs favourable to marijuana use and unsympathetic to traditional institutions, predicted marijuana use. Parental models, on the other hand, appeared to be more influential than that of peers in relation to initiation into alcohol use. Other factors such as greater exposure to peers and parent models of drinking, greater involvement with peer activities and some minor involvement in delinquency also predicted alcohol use. Those individuals who used other illegal substances appeared to be influenced by a degree of psychological distress, association with drug using parents and peers, poor family relationships and unconventional antisocial attitudes.

Kandel and her associates have widened the scope of socialisation theories by focussing on a range of social influences as well as personal and situational or contextual variables within an empirically bound developmental perspective. These patterns have now been observed in France and Israel as well as in the United States (Alder and Kandel, 1981), and therefore these findings do advance our understanding and acceptance of a stage theory of drug involvement within an interactive social framework.

4.10 An Evaluation of the Relevance of Socialisation Theories to Adolescent Drug Use

Socialisation or Social Learning Theories have added considerably to our understanding of the way that a variety of environmental and social forces influence young people. A wide range of theories have examined the effects of subcultures, institutional provision and opportunity, association with peers, lack of ties to conventional social groups and a stage or developmental sequence of drug involvement. Social theories generally try to specify how aspects within a social structure, external to an individual, produce patterns of drug use behaviour. Flaws in these approaches derive less from incorrectness than from incompleteness. Where social theories focus on one set of factors to the exclusion of others they can only offer a limited explanation. The effect of differential peer association, considered alongside a stage theory of drug involvement, where different factors attain prominence at different stages in the sequence of drug use, adds considerably to our awareness of the interactive and complex nature of substance use. If aspects of social theory can be examined simultaneously with other relevant factors then these

theories can assist and guide drug education and prevention programs.

Drug subculture theories appear to have limited relevance to current patterns of drug use which are spread widely across a diverse section of the community and include adolescents and adults who use a range of legal and illegal drugs. Strain and control theories also contribute only a small proportion of explained variance to our understanding of drug use and misuse. The most succesful of the deviance theories is undoubtedly peer association theory, where the emphasis on peer networks and friendships provides a more empirically sound explanation of substance use. The relationship between illegal drug use and association with peers who use drugs has been shown consistently to be important. From both a developmental perspective and a social learning theory point of view a differential association theory would make sense. The predictive power of a factor such as peer association may well be dependent on the type of substance used as well as the age of subjects, and it is necessary to examine other variables in order to develop a more comprehensive understanding.

Kandel's (1978) description of the developmental stages in adolescent drug involvement adds a further perspective to an understanding of adolescent drug use. Not only does it provide a developmental drug use perspective but it identifies the fact that different social and personal factors create different levels of susceptibility to drug use at different stages. The fact that individuals vary in their response to identical or similar social situations suggests

that individual differences also play an important role in determining who will use drugs and who will not.

Psychological factors, such as a general motivation or disposition to use drugs, may influence or predispose an individual to drug use, and in order to explain more adequately the nature of drug use the integration of other perspectives into a more substantial and interactive framework is required.

4.11 Psychosocial Theories (integrated models)

The integration of socialisation and psychological perspectives into what can be referred to as a psychosocial model expands and improves our understanding of the nature of adolescent drug use. Individual differences, social and environmental factors are all accommodated within a more over-arching and substantial multivariate framework. A number of theorists have developed an interactive framework in which drug use is examined from both a social and a psychological perspective (Huba et al, 1979 a,b,c; Jessor & Jessor, 1977; Oetting & Beavais, 1987; Simons et al, 1988; Weiss & Hawkins, 1981).

Problem behaviour theory (Jessor & Jessor, 1977) is an example of an interactive model formulated from a psychosocial perspective. The theory was devised originally to explain deviant behaviour, but it has since been expanded to examine a wide range of problem behaviours including drug and alcohol abuse. A major emphasis is placed on the development of a dynamic state called problem behaviour proneness and this state is determined by the interplay of

personality, the perceived social environment and behaviour factors. The perspective could be described as a psychosocial field theory where both personality and environmental forces interact and contribute to the development of behaviours considered either age inappropriate or socially unacceptable.

Each of three major systems of predictor variables are considered important as they impinge on the individual in such a way as to either constrain or permit problem behaviour. The perceived environment may, for example, include such factors as parents' and friends' approval or modelling of drug use. The individual's perception of the way that others behave or think may not be accurate, but this perception of the environment provides a point of reference from which judgements about possible courses of action can be evaluated. The behavioural system includes a problem behaviour structure or a conventional structure which determines the nature of drug use behaviour engaged in by the individual. If the young person engages in deviant behaviour, or behaviour that is generally reserved for much older children, then these behaviours are regarded as problems. The conventional behaviour stucture is concerned with socially approved behaviour, such as striving for academic success and involvement with religious activity. The levels of engagement and activity in each of the problem or conventional systems determines the degree of proneness to problem behaviour. Behaviour that departs from age appropriate norms is essentially what the problem-behaviour theory examines. In this sense the theory offers a social, psychological and developmental context from which the notion of age norms and age expectations are relevant. Murray and Perry (1985) comment that the

problem behaviour theory has helped focus attention on the social environment rather than solely on dysfunctional personality states.

A number of other psychosocial models of drug use adopt similarly integrative and interactive perspectives. The domain theory proposed by Huba et al, (1980 a,b; 1981 a,b) examines a range of biological, interpersonal and sociocultural influences. This model suggests that drug use is determined by the manner in which the various domains of influence interrelate. Initiation into drug use is believed to be significantly linked to self perceived behavioural pressure from the intimate support system, which includes peer and significant adult attitudes and behaviour. The authors suggest that preventive programs need to address both the intimate support system and personality factors.

A social development model, proposed by Weiss and Hawkins (1981), examines the formation of social bonds to school, family and peers. Weiss and Hawkins extend control theory by suggesting that behaviour patterns will become deviant if opportunities, social influences, performance in various activities, and reinforcement or rewards associated with such interactions are negative. As the adolescent matures a range of drug using opportunities will be created, but where strong bonds to family and school exist, delay or abstention from use may occur. The nature of the bonds may inhibit drug abuse, and therefore Weiss and Hawkins regard families, schools and peer groups as important factors to be considered when drug prevention programs are being developed.

The peer cluster theory (Oetting & Beauvais, 1986) also examines a range of psychosocial factors that may predispose an individual to drug use. Social factors such as school adjustment, family strength and sanctions as well as psychological variables such as self esteem, alienation from school and social institutions, social rejection, and deviance are all examined. However the potential for drug use is not realised, except within a peer association and influence context. More recently developed models such as the multistage social learning model (Simons et al, 1988), have incorporated an even wider range of psychosocial variables into one single but complex interactional model. The major emphasis in all of these models is a strong social learning theory perspective in which the influence of peers and parents is considerable.

4.12 An Evaluation of the Relevance of Psychosocial Models to Adolescent Drug Use

All of the theories identify several domains of influence that interact with each other and some clear similarities emerge. Predisposition to drug use may be tied to a range of personal or situational factors, but the significance of parents and peers within a social learning perspective often emerges. A number of theorists (Jessor & Jessor, 1977; Kandel, 1978) examine a developmental framework, which although not fully developed, recognises the fact that young people may be influenced by different variables at various stages in their development and progress into drug use.

The psychosocial theories are in essence integrative models, which attempt to describe the complex nature of substance use behaviour by linking together and describing a number of

psychological and social influence perspectives into one interactive framework. These theories are so broad and encompassing that it is difficult to find objections to the general tenor of their argument. A degree of strain is placed on theories however, because they try to integrate a considerable number of variables into one 'grand theory'. There may well be many paths to drug use, but no one theory can possibly expect to account for every possibility. Although it is still not possible to draw upon the psychosocial theories to account for every form of drug use by almost all drug using individuals, these theories do offer the most integrated and empirically viable framework from which to view adolescent drug use.

In many ways the psychosocial models consist of an eclectic grouping of variables not yet tied together into a clearly articulated and integrated theory. When seeking to incorporate a significant number of factors within an interactive account of the nature of drug use and abuse, it is difficult to specify the causal ordering of these associated factors and their precise relationship to one another. It may well be that the psychosocial theories are not yet in a position to fully explain all aspects of the process of adolescent drug use, but they represent a significant step forward in theoretical sophistication and power. The current state of affairs is such that much has been revealed; and yet there is still some considerable way to go. The problems experienced in finding adequate theory to describe adolescent substance use and abuse is merely a reflection of its complexity.

4.13 Which Theoretical Models Offer the Most Valuable Framework on Which to Build a Model of Intervention?

If the gap between aetiological research and prevention research is to be bridged, it is vital that the most relevant and useful theoretical models be examined. As each theory has sought to explain some aspects of drug using behaviour, different sets of influences have been implicated as dominant within each theoretical framework. Many theories, rather than one grand theory, may be needed to reflect differences in drug taking across various populations. It is essential that both the population and the phenomenon being investigated are clearly identified.

A number of theories based on psychological factors, biogenetic or drug effect factors, socialisation and social learning models and psychosocial frameworks have successfully explained various aspects of drug taking behaviour. Models such as the biogenetic, drug effect and personality theories which appear to the right or left of Figure 4.1 tend to reflect a relatively simple model where only one or two main variables are examined. Several theories of drug abuse emphasise the nature of psychological factors yet most of this research is cross sectional. Cross-sectional research essentially leaves unresolved the question of whether the personality traits noted by some researchers are actually antecedents or consequences of drug use and any attempts to describe a matrix of personality characteristics that might identify an addict personality are quite unrealistic (Pols, 1984). The personality, biogenetic and drug effect theories have generally focussed on the nature of chronic drug abuse with addicted populations and they offer very little to an understanding of the use of alcohol or tobacco with representative populations of adolescents.

The social and psychosocial theories have, to this point, more adequately attempted to examine both the nature of adolescent drug use and the interaction of a number of variables believed to be causally related to adolescent drug use. The psychosocial (interactional) approaches have attempted to incorporate social, psychological and developmental perspectives into complex but unified models which probably best reflect the increasing complexity of aetiological theory. Although these psychosocial theories examine many variables within their framework they appear to offer the most appropriate conceptual base from which to develop a model of drug education.

If drug education is to move beyond a random collection of ideas and loosely organised research findings, however, programs need to be based on an underlying theoretical framework which describes the phenomenon of adolescent initiation into drug use. Past drug education programs have not always provided the kind of clear information that is necessary to establish how relevant aetiological theories appear to be. Very few, if indeed any, theories of drug abuse are sufficiently developed to permit an accurate evaluation of their adequacy (Bentler, 1978), this reflects upon both the shifting nature of drug use and the complexity inherent in this field. Dozens of theories and scores of variables underscore the complexity of drug use and it is necessary to select a number of variables or particular theories that appear to offer the most adaptable framework and subject these theories and variables to scrutiny.

14.14 The Basis for a Model of Drug Education

Whilst no one model of drug education can possibly incorporate every aetiological perspective identified in the literature a number of important generalisations regarding the aetiology of drug abuse in adolescence can be made from the current social-learning and psychosocial literature. These findings, when considered alongside the wealth of correlational variables associated with drug use, can assist drug educators in the development of preventive programs:

1. A developmental progression for adolescent drug use exists in which drug use appears interrelated. The progression begins with legal substances and moves towards a range of illegal drugs.

2. A psychosocial perspective provides the most appropriate and relevant framework from which to develop models of education. From this perspective:

   (a) adolescent drug use usually occurs within a social context dominated by the influence of peers, peer association and parental modelling.

   (b) individual psychological differences such as poor bonding to social norms and conventional institutions, maladjustment and personality disorders can predispose individuals towards increased drug use (this predisposition is not fully realised however unless the individual associates with or is influenced by drug using peers).

3. Adolescent drug use needs to be understood from a developmental perspective. Developmental changes may predispose adolescents to risk taking and models of drug education need to take account of the characteristics of adolescence which can create a time of greater susceptibility to drug use influences.

In the past many would-be drug educators have developed programs which were atheoretical. Many programs were little more than a 'grab-bag' of ideas and techniques thrown together without reference to an underlying theoretical structure or model. When programs succeeded or failed (with failure being the most common experience), it was virtually impossible to identify what this meant.

The nature of many programs permitted no reworking or modification of theory regarding adolescent drug use, because programs were not tied to any conceptual model. In 1982 when this thesis was being developed the building of an intervention model based on an underlying conceptual framework concerned with adolescent drug use had not been attempted in Australia. The relationship between drug education interventions and underlying theory in general was still not clear. A diversity of beliefs and opinions regarding the likely causes of drug use and misuse and the most appropriate style of drug education still existed. In order to bridge the gap between aetiological formulations of adolescent substance use, and the development of educational interventions, a clearly articulated conceptual model was required.

The previous chapters examining the wealth of correlational information associated with adolescent drug use and the psycho-social theories that link these correlations together have provided a basis from which to build an intervention model based on underlying theory. The next chapter begins a model building process which integrates both developmental and aetiological considerations into a conceptual model of drug education.

Chapter Five: The Development of a Model of Drug Education

5.1 The Link Between Aetiological Formulations of Adolescent Drug Use and Program Development

This chapter describes a model building process which integrates aetiological and developmental considerations from previous chapters into a conceptual framework, from which a drug education program can be developed. Drug education programs need to be based on a carefully developed conceptual framework rather than on a pot-pourri of ideas and intuitive notions deemed to be causally related to adolescent drug use. Programs based on a conceptual framework, if tested empirically, can provide information regarding the relevance of the model's underpinnings and future drug education endeavours. Later chapters develop explicit assumptions and hypotheses regarding the nature of the intervention model.

The building of a drug education intervention model needs to be based initially on an understanding of the causes of adolescent substance use. The first stage of the model is the most fundamental, because at this level the direction for further development and model building is set. The key factors which appear to be associated with adolescent drug use need to be identified and placed into a coherent and integrated structure with explicit assumptions or hypotheses. The second stage of the model should contain implications for intervention derived from an understanding of the aetiological and developmental factors previously outlined in stage one. The second stage of the model acts as a bridge between aetiological research and the development of a model for intervention. Figure 5.1 identifies the structure, development and integration of the model building process, but it does not specify the actual nature of the elements which should be

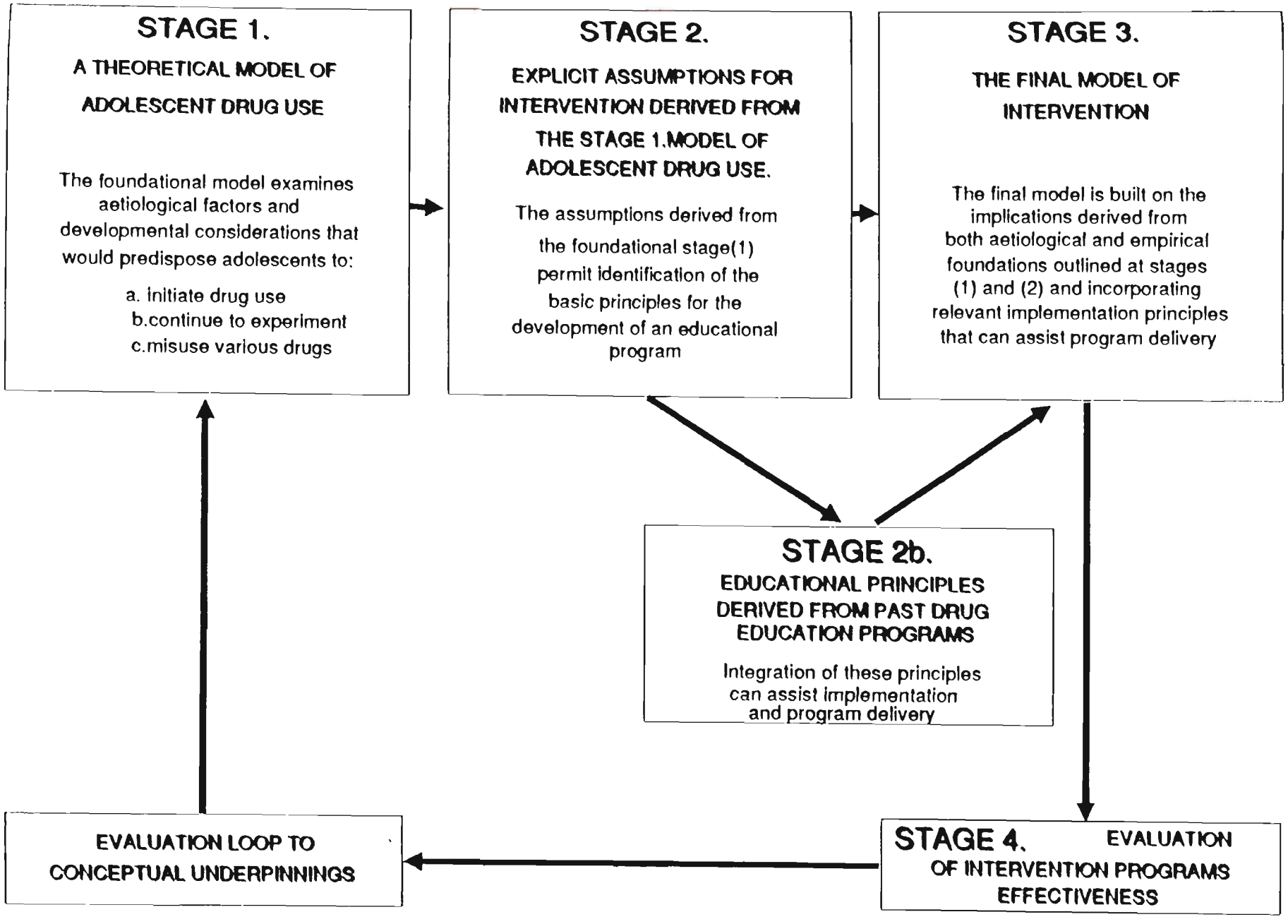


Figure 5.1 A conceptual framework identifying the components necessary for the building of a model of intervention for adolescent initiation and progression into drug use.

included at each stage. The model of intervention developed from this empirical and theoretical base can subsequently be trialled and evaluated. Because the program elements are based upon a causal framework, with explicit assumptions and hypotheses advanced to explain adolescent drug use, an evaluation of program outcome can provide critical comment about the adequacy of the theoretical framework.

If the program failed to change subsequent drug use behaviour there are other factors that may need to be considered before a causal interpretation can be established. It is possible that the quality of the drug education program was inadequate. The failure was therefore at the program construction and delivery level rather than at the conceptual level. In the past a number of program results have been contaminated by inadequate design, service delivery or methodological flaws. A number of program and research strategies were used in past educational programs that appeared to be counter-productive. If program design or delivery methods are not appropriate to the population or setting, then the program will fail to be an adequate representation of the underlying theoretical base. If this is the case results will have become affected by design or service delivery flaws, and any comment that the program evaluation hopes to make at a theoretical level will be considerably limited.

In order to ensure that the program construction and delivery adequately represents underlying theory, the model of intervention needs to be cognisant of past research concerned with implementation and program construction strategies. These program delivery enhancement principles or strategies do not address themselves to the

underlying theoretical model but focus on the nature of program delivery and the gradual refinement of the curriculum. They adapt the structures developed at a theoretical level to a form which is suitable for the nature of the target population and the setting. Figure 5.1 places these perspectives into a framework which permits evaluation of the final model of program intervention. Once the program has been evaluated, a feedback loop can then be established permitting comment to be made on the adequacy of the theoretical underpinnings.

5.2 The Underlying Conceptual Framework: Stage One - Developmental and Aetiological Factors that can Predispose Young People towards Use or Abuse of Drugs

The first stage in the process of building a model of drug education and intervention begins with the identification of variables that appear to be causally related to adolescent drug use. At this early stage the model should be empirically based on evidence available regarding the nature of adolescent drug use. One model cannot be expected to include all possible variables that have been identified as causally implicated in adolescent substance use. Dozens of theories and scores of variables underscore the complexity of drug use. However, if the gap between aetiological research and program construction is to be bridged then only the most relevant and important variables that account for a significant proportion of the variance should be examined.

The starting point for the development of a theoretical model describing the nature of adolescent substance use must be derived from an understanding of two major domains of influence over adolescent drug use behaviour:

1. The developmental characteristics of adolescence that predispose young people towards being influenced to use or abuse drugs.

2. The key psychosocial factors influencing adolescent drug use and abuse identified by aetiological research.

Based initially on the major domains of influence noted above a drug education model can be proposed. This model will focus specifically on the development of drug taking behaviour in representative groups of adolescents. It will also be concerned with the emergence of atypical or precocious drug use leading to possible abuse and illegal drug use in adolescence.

5.3 Psychosocial Perspectives: The Influence of Adolescent Development on Initiation and Progression into Drug Use

The developmental characteristics of adolescence may in isolation, or even in combination, lead to a relatively insignificant and harmless impact on the way some teenagers behave. When these developmental characteristics are viewed within a setting or social context in which alcohol, tobacco and a number of other psychoactive drugs are used, then the onset of adolescent drug using behaviour becomes highly probable. Developmental changes may predispose some adolescents towards greater risk for drug use. These changes include increasing cognitive awareness, the development of adolescent egocentric thinking and the search for a more mature identity and greater autonomy. A conclusion reached by many researchers and reported in Chapter 2 suggests that the onset of adolescent drug use and drug related risk taking behaviour is due to the systematic outcome of adolescent development and of the adolescent's perceived environment. Drinking in Australian society is a normative social

behaviour, as is the use of painkillers and other forms of self medication. Many adolescents also believe that a majority of adults smoke tobacco, and although this is statistically untrue, the perception of the environment as one in which significant numbers of adults engage in smoking behaviour is sufficient to encourage some young people to start smoking. From this perspective drinking and other forms of drug use may be regarded as learned social behaviours.

Initiation into drug use and experimentation with alcohol and other drugs may well be a form of adolescent individuation and part of a process of identity formation. A psychosocial developmental perspective suggests young people are particularly susceptible to a range of influences to begin substance use. Developmental changes predispose young people towards the search for a more adult identity where legal drug use is perceived as a 'marker' of adult status and increased conformity to peers occurs because of the limitations of adolescent egocentric thinking. Adolescent socialisation then provides a key for understanding the development of drug taking behaviours. Young people observe and imitate the behaviours of significant others. Their behaviour is then reinforced by peer approval and quickly internalised as a marker of a new and more sophisticated adult identity.

Despite earlier school and family experiences which are positive and relate to normal social bonding, peer influences exert strong pressures on adolescents to use gateway drugs. Peers, relative to parents, appear to exert a greater influence on adolescent drug taking behaviours than do parents. Peer and parent influences shape attitudes about drugs but peers generally provide the social context

in which drug use occurs. The nature of drug use is usually a direct reflection of the nature of the peer group. Peer associations can be either positive or negative, depending on whether the group chooses to use drugs or not use drugs. Non compliance with the reference group's expectations would mean that the non conforming member would be perceived negatively. As adolescents are often acutely aware of the 'imaginary audience' and are concerned with establishing a more mature adult identity disapproval would be avoided wherever possible. These perspectives form the basis for the building of an intervention model drawn from a psychosocial developmental influence perspective.

Adolescent substance use is therefore regarded as a socially learned, functional and purposeful behaviour which is determined by an interaction between individual developmental characteristics and a matrix of social influences. A small percentage of young people continue experimentation with drugs to the stage where use becomes misuse. Both typical and atypical drug users are influenced by maturational factors and by a social context in which legal drugs are widely used. Additional explanations are necessary, however, to explain why some individuals misuse drugs and others do not. There are a number of situational and personality variables that appear to influence atypical drug use in adolescence.

5.4 Psychosocial Determinants of Adolescent Drug Taking Behaviour

Young people who hold attitudes or beliefs that support a higher tolerance of deviancy, and who appear to exhibit weak bonds towards conventional school and social values, appear to be at considerable risk. These young people may also experience higher levels of school

failure and rebelliousness and begin to use drugs earlier than their more conventional peers. A conventional upbringing on the other hand appears to be linked to normal or reduced levels of drug use. Young people who have closer ties to parents and family values and who have a strong commitment towards school achievement and conventional social values do not generally place themselves at risk for subsequent drug misuse nor do they commence drug use at an early age. Early entry into substance use activity is often correlated with subsequent misuse problems whereas later or delayed entry into drug use appears to be protective (Robins & Przybeck, 1985; U.S. Department of Health and Human Services, 1987).

The concept of stimulus seeking behaviour, as a part of a desire for increased awareness, identity and enjoyment, appears to be linked to drug use. Many young people take drugs to 'have a good time' or to relax and relieve boredom. Some individuals, however, may seek greater levels of thrills, adventure and stimulation, and thereby place themselves at greater risk. Perhaps strain and control theory explanations linking drug use to reduced social bonding, school failure and alienation from conventional social norms, can in combination with other variables, such as boredom, lowered self esteem, anxiety or depression, increase the likelihood of stimulus seeking behaviour.

In order to accommodate the range of psychosocial influences that can either augment or diminish an individual's susceptibility to drug use a model of adolescent drug use has been presented in Figure 5.2. Two perspectives are combined in Figure 5.2, which permits the reader to identify both the variables and their respective influence on

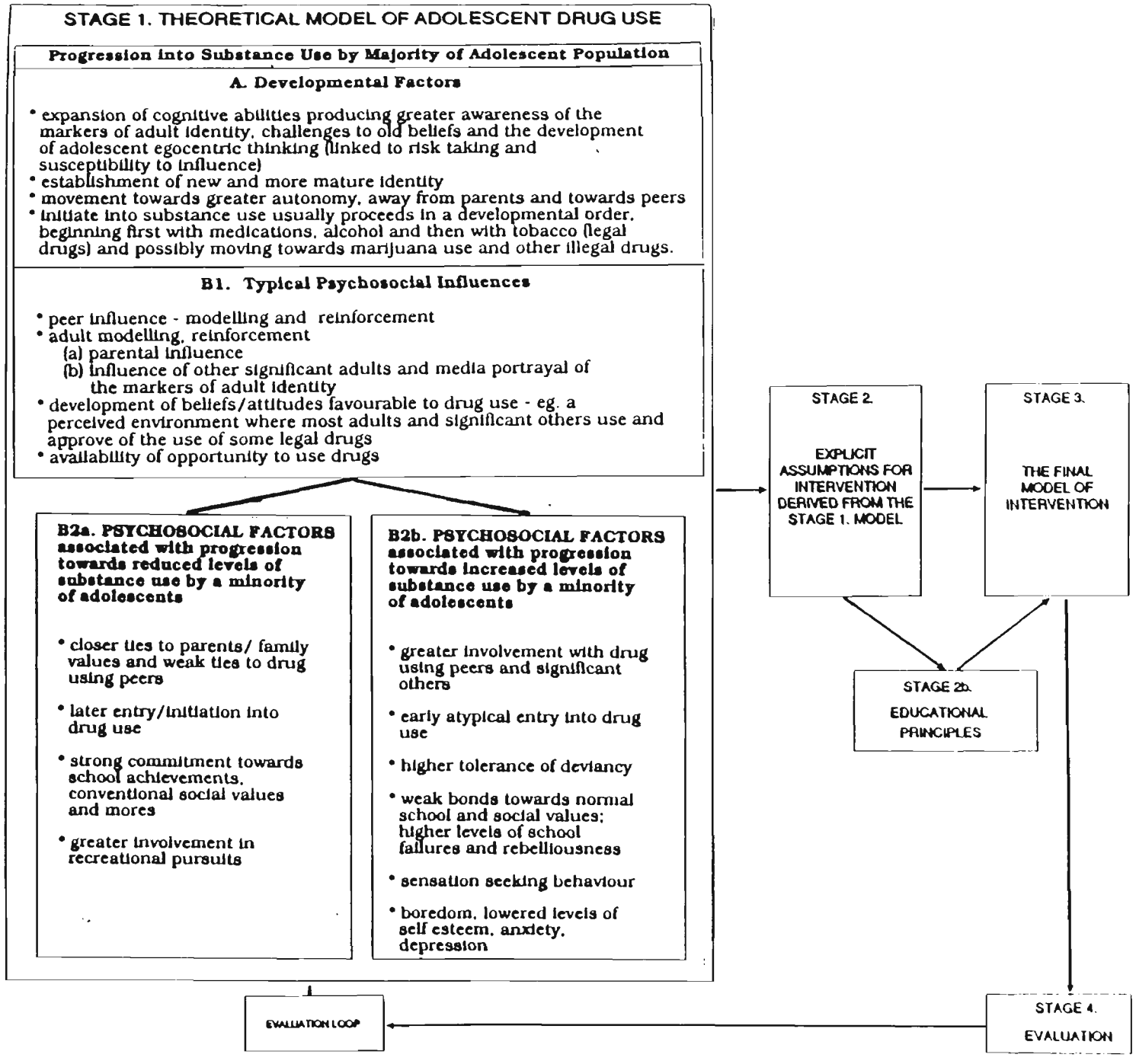


Figure 5.2 A psychosocial development influence model of adolescent initiations into substance use.

drug use and the stage that has been reached in the progression towards building a final model of intervention. The stages in building a model of intervention for drug education have been outlined earlier (Figure 5.1), but exist only as a skeleton or framework describing the more general model building process. In order to move from a general conceptual structure (Figure 5.1) to specific detail regarding the precise nature of the model each stage needs to be fully described and expanded. Each of these stage models is either based on a synthesis of available literature, or is built on the implications derived from a previous stage. The first stage in the intervention model building process (Fig 5.2) is concerned with the formulation of a foundational model that explains adolescent drug use. A number of key variables that appear to be causally related to adolescent drug use have been identified in Figure 5.2. Because the explanations for drug use in adolescence are drawn from perspectives that examine psychosocial and developmental factors as major influences, the foundational stage is identified as a psychosocial developmental influence (P.D.I.) model. The second perspective examined in Figure 5.2 is the identification of (precisely) where the P.D.I. model fits within the overall model building framework.

The middle path outlined in Figure 5.2 shows that all young people experience a number of developmental changes which predispose them towards drug use. These changes are embedded in a psychosocial context, dominated by a social learning perspective in which parents and peers influence attitudes and behaviour. The middle path describes factors associated with typical drug use in adolescence and the vast majority of the adolescent population will fit into this path. A proportion, however, will fit on either side of the

normal route as some young people use almost no drugs whereas others are influenced to experiment with a variety of substances that can have serious health threatening consequences. Factors that can minimise or increase the likelihood of adolescent drug use and further progression into drug abuse are listed to the left and right of the middle path describing normal levels of progression. The two minor paths to the left and right of the middle path described in Figure 5.2 account for a much smaller percentage of the population and although influenced by similar factors to commence drug use the variables exist to either a greater or lesser degree.

The psychosocial developmental influences model describing adolescent initiation into substance abuse provides a conceptual base from which a model of intervention may be further developed. The stage by stage progression towards a final model of intervention has already been described in Figure 5.1. The first stage of the model building process concerned with the formulation of a theoretical model explaining adolescent drug use (the P.D.I. model) has now been described. The second or middle stage is essentially a bridge building stage, where implications derived from the theoretical model of adolescent drug use just outlined in Figure 5.2 are translated into explicit assumptions concerned with intervention. The second stage is conceptually driven, but practically oriented as the assumptions derived from the stage 1 theoretical model of adolescent drug use are now used to identify the basic principles underpinning the development of an educational program.

5.5 Stage Two: The Bridge Between a Theoretical Model of Adolescent Drug Use and Program Construction

There are a number of factors, identified in the stage 1 theoretical model of adolescent drug use, from which implications for intervention can be derived. Due to the nature of developmental forces at work within each young person the timing of any drug education and intervention program should begin at an early age, in order that health enhancing beliefs can be established prior to entering the heightened stage of susceptibility which occurs at adolescence. There appears to be strong evidence supporting the belief that a later age of onset into drug use is associated with lesser involvement and greater probability of either not developing problems or reducing the level of problem use (Kandel, 1982; U.S. Department of Health and Human Services, 1987). It is therefore important that drug education commences prior to adolescence. It is also important that the model of intervention targets developmentally appropriate substances, rather than a range of illegal or more exotic substances. As the main drugs used in early adolescence are medicines, alcohol, tobacco and then marijuana, these substances should be targetted.

Because the development of adolescent egocentric thinking is linked to a time of increased susceptibility to risk taking, intervention programs need to develop a range of risk reduction strategies. These strategies should include the provision of up to date information on drug use as well as decision making and behaviour rehearsal strategies that can minimise the risk of being influenced by negative peer pressure. Information regarding both the present and future effects of health compromising drugs, and the levels of drug use in the community should be provided in order to counter many of the false

assumptions that often form part of an adolescent's perception of the environment.

Intervention programs might choose to promote a range of alternatives and activities to drug use that could fulfil the needs of young people who have experienced school failure, reduced social bonding, lowered self esteem, boredom or stimulus seeking behaviour. As drugs are often used to achieve positive states the provision of a range of alternatives to drug use could fulfil these needs through non-chemical means.

Because adolescent drug usage occurs within a social context it is important that intervention programs consider the nature of influences that encourage substance use. As adolescents seek greater autonomy and move away from parents, the modelling and reinforcement effects of peer association increases considerably. Because peer influences are significant during adolescence intervention approaches utilising peer communication and peer led groups could be of benefit. Such approaches could assist in the development and ongoing maintenance of open communication between peers. It is also possible that peer discussion and peer influence developed within the context of a harm reduction drug education program could establish a set of community adolescent norms regarding responsible and minimal levels of drug use. If a drug education program could be developed that offered sequence, continuity and progression over an extended duration peer involvement could be maintained over a number of years, and this would permit the possibility of using same age and older peers to maintain the minimal drug use message.

Parents and families are also important influences and where possible they should be involved in drug intervention programs. The possibility of community and school collaboration provides an opportunity to establish and reinforce open communication about desirable and socially approved behaviours. If parents, peers, schools and local community publicly commit themseves to the promotion of a healthy, minimal drug use lifestyle, that challenges media and pro drug use attitudes, young people may reduce their drug use levels, delay initiation, or even choose to abstain from using some drugs.

Figure 5.3 outlines the implications for intervention and the development of an educational program. These implications or assumptions, regarding the nature of a model for drug education, have been derived from the stage 1 model of adolescent drug use (P.D.I. model). Once again a model building perspective has been maintained in order that each stage in the model is outlined in relation to the overall conceptual framework previously presented in Figure 5.1. By first developing a model that has examined the causes of adolescent initiation into drug use (Stage 1), outlined in Figure 5.2 and then identifying the implications for intervention derived from that model (Stage 2), outlined in Figure 5.3 a bridge between aetiological research and the construction of an intervention program has been built. Before a final intervention model can be outlined in greater detail, one more step in the model building process is required.

In order to ensure that the final model is appropriate to the nature of the setting and the population for which it is intended, a

STAGE 1.

THEORETICAL MODEL OF ADOLESCENT DRUG USE

EVALUATION LOOP

STAGE 2.EXPLICIT ASSUMPTIONS FOR INTERVENTION DERIVED FROM THE STAGE 1. MODEL(P.D.I. model)

1. Because adolescent substance use is a complex process involving influences from parents, peers, schools, the media and the community these same forces need to be involved within the intervention process.

2. Due to the nature of developmental forces the timing of drug education should begin at an early age (prior to adolescence) in order that:

(a) pro-healthy lifestyle and attitudes can be established before entering the heightened stage of susceptibility to influence that occurs in adolescence.
(b) the possibility of influencing young people to delay entry into substance use could occur as delayed entry is linked to levels of minimal or moderate drug usage.
(c) the concept of preventive education and intervention can actually be realised.

3. As initiation and progression into drug taking appears to begin with the development of pro-drug use attitudes to legal drugs intervention programs need to promote the development of minimal and responsible attitudes to legal drug use rather than focussing on a range of illegal or more exotic substances.

4. Because adolescent substance use is influenced by developmental factors peer group association and a 'perceived environment' where most young people use a variety of drugs intervention approaches should:-

(a) provide information on present and future effects of drugs and counter incorrect assumptions regarding the nature and prevalence of drug use by peers and the general community.
(b) counter the influence of peer, community and media pressure by developing strategies which can strengthen a young person's decision making ability and assist delayed initiation into drug use or reduce levels of experimentation.
(c) use positive peer communication and peer led group activities directed at the establishment and maintenance of open communication, pro healthy lifestyle and minimal drug use behaviour.

5. Community and school collaboration via the involvement of parents and peers in the program permits reinforcement and public commitment to be made to the pursuit of a healthy drug free lifestyle that can challenge pro drug use sentiments expressed by media and negative peer influence.

6. Because psychosocial factors such as sensation seeking, reduced social bonding, school failure, boredom and lowered self esteem may in combination with other factors create a need for the experience of positive states the promotion of a range of alternatives to drug use should be developed.

STAGE 3.

THE FINAL MODEL OF INTERVENTION

STAGE 2.b EDUCATIONAL PRINCIPLES

STAGE 4. EVALUATION

Figure 5.3 The identification of explicit assumptions regarding the nature of intervention derived from the P.D.I. model of adolescent drug use.

range of educational principles need to be examined. In the past a number of counter productive educational strategies have been employed. It is therefore important that the final model of intervention is cognisant of past drug education research regarding the relevance of implementation and program construction principles. If the nature of program delivery or design is to represent adequately the underlying theoretical base on which it is established, educational principles which can maximize the likelihood of successful delivery and effectiveness need to be identified and incorporated into the final model of intervention.

Chapter Six: The Identification of Educational Principles that can Assist in the Translation of a Theoretical Model to a Classroom Program

The purpose of this chapter is to develop further the model building process in order to link the underlying theoretical assumptions of the psychosocial developmental influences model to a suitable implementation framework. In 1982 and 1983 when this research was being developed, very few education programs could claim success in preventing or reducing drug use amongst adolescents. Until this time most drug education programs had been largely atheoretical; but as drug educators began to develop different models based on various theoretical frameworks, a number of questions regarding implementation strategies and research methodology clouded the issue. Had the program failed because of the wrong implementation principles, or was the theoretical framework on which it was based incorrect? The answer to such questions can be even more difficult to ascertain since many programs failed to employ a sufficiently rigorous research methodology. Having outlined (in Chapter five) a conceptual base from which a drug education program can be developed, this chapter will identify and subsequently incorporate into the model building process a set of educational principles that can assist in the implementation of a theoretically derived model of drug education.

6.1 Information Based Intervention Programs

Early drug education programs were based on the belief that children and adolescents used drugs because they were unaware of the consequences that drug use could have (Bell and Battjes, 1985).

The information based approach appeared, to the casual observer, a most sensible model on which drug prevention programs might be built. Information programs can increase knowledge about drugs; but these programs have been considerably less successful in altering attitudes to drug use. They have been spectacularly unsuccessful in reducing subsequent use or misuse of alcohol or drugs (Barnes, 1984; Goodstadt, 1978; Hanson, 1982; Kinder, Pape, & Walfish 1980; Plant, 1980; Smart & Fejer, 1974; Swisher, 1974). Some studies have actually reported an increase in drug use following the implementation of drug education programs (Blum, 1976; Carney, 1971; D,Augelli, 1974; Goodstadt, Sheppard, & Crawford, 1979; Stuart, 1974; Swisher & Horan, 1973). Hanson (1982) pointed out that there was no evidence to suggest that knowledge acquired from drug education programs actually causes drug use, but considerable evidence exists which indicates that drug users possess greater drug knowledge and information than do non users (Hanson,1980; Smart and Fejer,1974). The link between possessing greater drug knowledge and increased levels of drug use is a very tenuous one as the most plausible explanation, according to Hanson (1982), may be "that greater knowledge results from drug use rather than vice versa" (P4).

6.2 Counter-Productive Educational Strategies

Goodstadt (1980) reviewed the evidence regarding the negative effects of drug education in the early 70's and concluded that the data are largely correlational, and therefore it is inappropriate to make causal inferences. In the 15 studies examined by Goodstadt, negative findings were reported alongside positive findings in each study. Very few studies were free from major experimental design problems, thus

making it difficult to isolate variables responsible for the negative outcome. What had become clear, however, was the fact that drug education was not a simple process. Smart and Fejer (1974) pointed out that early drug education endeavours developed "out of a need to do something and to do it quickly" and as a result programs lacked adequate research planning or theoretical sophistication.

Early programs tried to provide the 'facts' about drugs. Often these 'facts' were exaggerated in order to convince adolescents of the dangers that existed. In their zeal to influence young people educators resorted to 'scare tactics' and misinformation. Adolescents rejected these appeals as misinformed and erroneous, and both the message and the educators who articulated such 'facts' were dismissed as lacking in credibility (Kinder, Pape and Walfish,1980). Kinder et al (1980) comment that although the literature on the use of fear based messages is sparse there is general agreement that such messages are not effective as a means of changing drug related behaviour patterns.

Early program planners further complicated matters by using a range of other counter productive approaches, including media warnings, ex-addict testimonials and one night stands (Webb, Egger & Reynolds (1978). Media warning campaigns which start from the best intentions can be extremely dangerous. The American Consumer's Association traced the spread of glue sniffing amongst young people from town to town where media warning campaigns had occurred in order to warn people of the danger. Ex-addict testimonials were used as a form of 'scare tactic', but the powerful non verbal message contained in these presentations was "that its possible to use drugs

and then give them up". Research suggests that only a small number of narcotics addicts will survive once a serious habit has been formed. When one night stands were used information pamphlets containing warnings or basic facts were handed out. People went away with a simplistic view of drug misuse based on misinformation and fear.

The failure of early drug education strategists in not focussing on the major drugs of dependence, such as tobacco, alcohol and over the counter medications, is also closely linked to the general failure of early program endeavours. The focus of many programs was on the more exotic illegal drugs, and this may have consciously or unconsciously implied that there was no need no be concerned with the use or misuse of legal drugs. It is in many ways a false arrangement of legal and illegal drugs into a framework that suggests a clear dichotomy. Drug use can be viewed by educators more accurately from the perspective of a continuum along which individuals may choose to move. Individuals who have developed attitudes and behaviour accepting misuse of legal drugs are quite likely to misuse illegal drugs (Kaplan, 1979; Wechsler & Rohman, 1981; Welte & Barnes, 1982).

Because of the importance of assisting students to develop appropriate attitudes to legal drugs the timing of preventive programs also needs to be considered. The timing of preventive drug education programs should probably begin at an age at which drug use is either not occurring or at the very least is just beginning. In so doing these programs can take advantage of the natural openness and general compliance to adult authority that is characteristic of the pre-

adolescent child. At this stage of development, both the epidemiological evidence, and the work of Kandel (1978) identify that fact that, legal drugs are the drugs used first and therefore these drugs should be targeted.

6.3 Problems of Interpretation Relating to Inadequate Research Methodology

As doubts continued to grow regarding the effectiveness of drug education, governments began to ask questions about the precise nature of programs and the adequacy of research methodology. In Australia it was recommended that all drug education programs be adequately evaluated and that funds be withdrawn from ineffective programs. By 1974 however, after a provision of more than six million dollars of federal funding, the Australian Drug Education Sub-Committee of the National Standing Committee could find only one study relevant to drug education and even this study was not considered adequate (Kraus 1979). The problem of interpreting the results of such research evidence is not only complicated by the fact that many programs were not evaluated, but also by the fact that the vast majority of studies which were evaluated had gross inadequacies in scientific methodology (Benjamin, 1978; Berberian, 1976; Goodstadt, 1974, 1980; Kinder, et al., 1980).

Berberian, Gross, Lovejoy and Paparella (1976) reviewed 27 studies in the late 1960's and early 1970's. The vast majority of these studies had poor experimental designs. Some were merely descriptions, others had an absence or lack of adequate control groups, an absence of pre and post tests, inappropriate sample sizes and extremely brief follow up periods. Other studies failed to examine

the most significant criteria of success or failure - subsequent drug use. Randall and Wong (1976) reviewed over 200 published accounts of drug education between 1967 and 1976 and found only 23 that reported any systematic evaluation. Only 15 studies used both pre and post test treatment measures linked to an appropriate control group design. Randall and Wong (1976) concluded that "with rare exceptions, efforts to date don't go very far in pointing the way for the future" (P2).

Goodstadt (1980) examined 15 studies that had reported negative findings. Few of the studies were free from major experimental design problems, such as non random design, small sample sizes, large sample attrition, poorly defined variables, absence of follow up and low intensity programs. Schaps, Di Bartolo, Moskowitz, Palley and Churgin (1981) examined 127 primary drug abuse prevention programs and considered that only ten studies met criteria indicating high or exemplary levels of program design and research methodology. In terms of the quality of research design, 41% of studies were judged to have strong or acceptable designs with the remainder ranging from borderline to completely substandard. 17% percent of studies had no comparison groups, 15% of studies had an unacceptable non random grouping and a further 28% used weak non-randomisation procedures. Schaps et al (1981) made the point that when research design quality ratings were correlated with year of publication no significant trend over time was found. The authors' conclusions are of concern as they found no evidence to suggest that research rigour had improved over a ten year period.

6.4 The Affective Model of Drug Education

By the mid 1970's as information based programs fell from grace a new wave of 'would be' drug educators emerged. The new model approached the problem of drug use from a personal or social skills framework. The "affective model", as it has more recently been referred to, assumed that young people used drugs because of deficient communication or interpersonal skills often coupled with a low self esteem and some degree of personal inadequacy (Ellickson, Bell, Thomas, Robyn & Zellman, 1988). Correlational research described in earlier chapters linked drug use with a number of personality characteristics. These research findings appeared to offer drug educators a better foundation from which to begin again. As the earlier intuitive and 'common sense' notions that had underpinned the information-based approach had been counter productive, the correlational research findings appeared to provide a more solid foundation from which to start. The research upon which the 'affective model' was based required closer examination however.

Implications for adolescent drug education were derived from research often conducted on an entirely different population (e.g. adult drug addicts). Most studies that investigated the role of personality variables were also cross-sectional and it was not possible to ascertain if these variables were antecedents or consequences of drug use. Results from these programs were equivocal, at best, and the vast majority of studies continued to suffer from methodological and design flaws (Battjes, 1985; Bell & Battjes, 1985; Blum et al., 1978; Goodstadt, 1980; Schaps et al., 1981). In the desire to minimise the problems encountered by information based 'affective' drug education

approaches the measures that were used to evaluate success or failure became focussed on self awareness and self esteem, and not on the question of drug use. Results from these programs failed to demonstrate a clear link towards reduced drug use (Goodstadt, 1981).

In keeping with earlier research studies the affective model encountered difficulties in relation to specificity of goals and outcome criteria. The failure of drug education to prevent subsequent use of drugs is linked to a failure to make explicit the principles underlying program design, implementation and evaluation. At the time this research was being formulated, (1982) the 'affective model' continued to enjoy considerable popularity in Australia. A thorough analysis of the aetiological and developmental literature would have indicated that a naive personality trait approach was an incomplete refocus.

6.5 The Emergence of a Psychosocial Perspective

The early 1980's saw the emergence of psychosocial prevention approaches that attempted to integrate aetiological research based on social learning theory (Bandura 1977) persuasive communications theory and psychological innoculation theory (McGuire 1964, 1969, 1974) and Jessor's (1977) problem behaviour theory. The newer psychosocial prevention approaches had a common perspective in which substance use was viewed as a socially learned purposeful behaviour that was determined by the relationship between the individual's developing maturity, personal factors, and a number of social environmental influences. These new programs appeared to succeed because they took note of aetiological research incorporating a more complete description of the causes of substance use and they

employed a number of educational principles relevant to the target group. Particular emphasis was given to social skills training focussing on the teaching of peer resistance and peer refusal skills infuenced primarily by a psychological innoculation paradigm.

The psychological innoculation approach is similar to an immunology paradigm in which an organism is exposed to a weakened, or reduced form of virus, in order to permit the immune system an opportunity to develop antibodies. If one's goal is to produce attitude change, or resistance to maladaptive behaviour, then presenting both the negative sides and the positive sides of the argument may be more effective than only presenting one viewpoint. Resistance to peer or media pressure to smoke can be strengthened, according to this model, if counter arguments have been developed following exposure (cognitive innoculation) to pro drug use messages. Program developers were also able to draw upon implications from McGuire's (1968, 1969, 1974) persuasive communications theory of attitude change.

Persuasive communications theory identifies the importance of source and message variables. McGuire distinguishes between a number of communications components. The first is concerned with source variables, where credibility, attractiveness, and power are important. Messages by temperance groups, for example, that are exaggerated or distorted were quickly rejected by adolescents. A second component is associated with the message itself, and variables such as the type of appeal, inclusions and omissions as well as order of presentation and discrepancy from the receiver's initial position are included. Other components of a persuasive communication examine

channel and receiver destination variables. McGuire's communications model identifies a sequence of six steps for behaviour change. The target population is exposed to a persuasive communication and they are required to attend to the message, comprehend it, agree with it, retain the agreed-upon understanding and act accordingly. Early 'would-be drug educators' assumed that attitude change was a simple process which only required that information be dispersed in order to produce change. McGuires' work on the Components of Persuasive Communications dispels such a simplistic view.

The educational strategy of training young people in behaviour rehearsal and peer resistance was based on the fact that almost all adolescent substance use occurred within a social learning context in which peers were the major influences. The work of Evans et al, (1978, 1981) was perhaps the most influential and representative of the new generation of psychosocial drug prevention endeavours. These programs used same aged peers on film as attractive, similar and credible source variables to give information on the major social influences supporting tobacco use. The focus of the rebuttal arguments were largely based around short term consequences of smoking rather than long term effects. Program evaluation results examined drug use and although immediate effects appeared to be promising, there were no significant effects one to three years later. The authors did claim significant effects for a small subset of the original population. Flay (1985) pointed out that subjects were not identified and only cross-sectional analyses could be completed. Therefore it was difficult to ascertain the exact nature of program effects over time due to the changing nature of the population. Flay

(1985) concludes that "despite the inconclusive results of the Houston studies the theoretical derivations seemed firm enough to encourage other researchers to strengthen and test the approach further" (P70).

The use of peers to try and establish adolescent group norms utilises a social learning and persuasive communications theory perspective. Peers are significant influences in the lives of young people. They could also be regarded as attractive and reasonably credible source and channel variables that can affect the development of attitude and behavioural intentions. Attitudes and behaviours are generally determined by formal communication or group dynamic influences (Zimbardo & Ebbsen, 1970). Formal structured communication occurs by advertising or media information and by word of mouth. Attitude change occurring as a result of a group dynamics influence can take place when discrepancy is perceived between a group norm and an individual's behaviour or attitude. The agent of change is the pressure towards uniformity within a peer group, deriving from a need to be accepted, or from a fear of being rejected.

According to Flay (1985) there have been approximately four generations of studies based on social influence models beginning with the work of Evans et al (1978). In subsequent years second and third generation studies further developed the innoculation and communication model by utilising elements of social learning theory and cognitive attributional approaches that examined the beliefs held by individuals. It was recognised that the 'perceived environment' of many adolescents was often founded on 'beliefs' that needed to be disputed. Many adolescents, for example, believed that most young

people smoked tobacco or held beliefs indicating that marijuana use was in no way injurious to health. These beliefs were not based on fact, but they supported and promoted adolescent drug use behaviour.

One theoretical perspective regarding preventive health behaviour which identifies those issues which are important to a person's decision making process is the Theory of Reasoned Action proposed by Fishbein and Ajzen (1967, 1975, 1980). The Theory of Reasoned Action is concerned with predicting whether an individual will or will not perform a specific health behaviour. From an intervention perspective, the theory operationally defines the specific elements that determine whether or not an individual will perform a specific health behaviour over which volitional control can be exercised (Ajzen, 1985).

The model assumes that the intention to perform a specific behaviour is a function of attitudes towards the behaviour in question and the influence of the social environment or general subjective norms on the behaviour. Social norms are determined by an individual's normative belief about what significant others think should be done and the individual's level of motivation to comply with the wishes of others. Attitudes towards the behaviour are linked to the perception that a given outcome will occur if the behaviour in question is performed. With relation to drug use behaviour, outcomes evaluated by the individual may include the likelihood of becoming addicted or sick by using a certain drug, or remaining healthy by choosing to remain abstinent.

The implications for educational intervention arise out of the model's ability to identify salient and potentially modifiable psychosocial determinants of a target health behaviour. In order to create the potential for appropriate health behaviour to occur, the model directs attention to the creation of appropriate health enhancing attitudes and subjective norms as significant psychosocial targets for intervention programming.

During the early and mid 80's the second and third generation social influence studies continued to improve and provided encouraging results. Many of these studies used high school students as 'peer' teachers and a range of more innovative approaches were developed including sessions to increase social commitment not to smoke, correcting misperception about myths, learning about media pressure, and role rehearsal practices in refusal and resistance techniques. One prevention program also reported success with other drugs such as alcohol and marijuana as well as tobacco (McAllister, 1980).

The fourth generation of studies attempted to overcome the problems of the past by adopting a more rigorous methodological approach (Flay, Ryan, Best, Brown, Kersell, D'Avernas & Zinna, 1985). The Waterloo study, for example (Flay, et al., 1985), incorporated principles from a wide range of theoretical positions including psychological innoculation and persuasive communications theories (McGuire, 1964, 1968), social learning theory (Bandura, 1977), attribution theory (Jones et al., 1972), commitment theory (Kriesler, 1971) and decision making theories (Janis & Mann, 1977). The program was focussed one year earlier than most previous studies,

and targeted sixth grade students. A longitudinal follow up was used and attrition rates were down from the 60-70% level often reported by previous studies to 34% after two years. Program effects on mediating variables were substantial as were program effects on behaviour; and this even appeared to be increasingly so over time. The results offered substantial validation for the theoretical underpinnings of a psychosocial model in relation to smoking prevention.

Further validation of the model also came from an Australian study by Fisher, Armstrong and De Klerk (1983), who modified a program developed originally in Minnesota by Arkin, Roemhild,Johnson, Luepker and Murray (1981). The program was delivered to Grade 7 students using both teachers and peer leaders. At a one year follow up results indicated that both teacher and peer led programs had been equally successful in reducing the onset of smoking for girls. The results for boys indicated that after adjustment for the effect of social risk factors only the teacher led program was effective. Other studies are reported by Flay (1985), who should be consulted for further information. Flay notes however, that methodological problems such as obtaining random assignment, problems with program implementation and serious attrition rates still remained as a clear reminder "of the difficulties of large-scale school based research".

6.6 The setting for this study

In Australian schools by the end of the 1970's and early 1980's school drug educators seemed largely unaware of the promising social influence approaches, and the 'affective model' continued to

gain popularity. A substantial amount of drug education had occurred in schools and the confused and often inappropriate strategies that had characterised previous program attempts were still reflected and perpetuated in educational settings. According to Benjamin (1978), drug education in Australian schools "tended to be inadequate, unplanned, unco-ordinated and unevaluated" (p.56). A few positive signs appeared to be emerging from the literature available in the early 1980's that indicated a general improvement in the ability of drug education to produce positive changes. The changes appeared to be minimal and evidence to adequately support the effectiveness of drug education was still limited.

The current study emerged from such a background in 1982. The problems associated with drug education were far from resolved, and a range of unsubstantiated claims were being made for a variety of programs. At that stage in Australia there appeared to be no sound educational philosophy of drug education, nor any form of substantial evaluation of what might offer the promise of success. Australia was certainly not alone in this predicament. Drug misuse continued to escalate, whilst educational program designers struggled to make sense of a substantive body of emerging evidence regarding the nature of drug abuse prevention and the aetiology of adolescent drug use.

With hindsight, it is now possible to trace the beginnings of the early psychosocial programs of the late 1970's and early 1980's but in 1982 as this program was being formulated a clear perspective had not emerged. The most recent review of drug education appearing in the literature at that time did not suggest that drug education research and program development had significantly improved. After

examining 127 drug abuse prevention programs Schaps, et al (1981) concluded that only minor effects on drug use behaviour and attitudes could be claimed for the vast majority of programs examined. Only ten programs were able to meet the criteria of delivering a fairly intensive program coupled with fairly rigorous evaluation designs; and eight of these programs produced positive drug-specific outcome ratings. It needs to be noted that only four of the ten studies actually used measures of drug use behaviour; and only two of these showed positive impact upon such behaviours.

· Programs delivered primarily by peers or by parents produced more positive outcomes than programs delivered by teachers or program staff, although the differences amongst service delivery agents were not statistically significant. Such a finding supports the conclusions reached in the earlier section that examined the social learning and developmental influence of peers and adults. Program strategies which appeared most successful included family relationship building and alternatives strategies. Perhaps the family relationship strategies owe some of their success to the fact that parents and peers, used as service delivery agents, were regarded as significant influences. Alternative strategies, on the other hand, require further explanation and investigation.

6.7 The Emergence of an Alternatives to Drugs Approach as an Effective Form of Educational Strategy.

The possibility of reducing drug problems through the promotion of a range of alternative activities was one of the earliest responses to the drug problem. Advocates of the approach suggested that a range of positive and drug free activities and experiences be provided in order to prevent individuals seeking a range of drug

related experiences. It was assumed that a set of competing reinforcements, such as involvement in sports, hobbies, outward bound programs, religious activities, or youth clubs would prevent drug misuse. Alternatives programs were believed to be important as they satisfied the unfulfilled needs and motives of individuals. The model assumed that by generating a range of satisfying options that could meet the needs of young people the demand for drugs would be eliminated.

Swisher and Hu in 1984 reviewed several different alternatives to drug use and identified four models. The first model focussed on the provision of a range of general activities for young people, whereas the second model attempted to match underlying needs to specific alternatives. The third approach involved the enhancing and enlargement of existing alternatives. The fourth model encouraged young people to develop or adopt a socially acceptable project, such as the restoration of an old building.

There is some correlational evidence available which suggests that drugs are taken because of a stimulus seeking motive. A number of individuals who use drugs have poor bonding to social norms and may have some degree of personality disturbance or alienation to conventional institutions. These individuals may need a legitimate outlet for the release of energy and frustration. Some sporting and adventive activities may provide such an outlet, but it is also common for a number of these activities to be associated with alcohol consumption.

Swisher and Hu (1984) conclude that the evaluation literature on alternative programming and its link to drug use is too sparse and conclusions cannot be drawn. There is a need for additional research that explores what types of alternatives can work, with what kind of individual; but the approach still appears to hold promise. A review of 143 adolescent drug prevention programs by Tobler (1986), also adds to the belief that alternatives programs appear capable of producing positive results. Tobler's (1986) meta-analysis of programs placed alternatives based approaches as second to peer led behaviour rehearsal programs. In order to adequately answer the question "can alternatives reduce or prevent drug use?" it is probably necessary to specify which alternative and which drug are to be examined. Although both Schaps et al (1981) and Tobler (1986) identify alternatives based programs as valuable, a lack of specificity remains and careful selection and monitoring of activities is required.

The debate regarding the 'alternatives' approach to drug education like so many other drug education program approaches still remained unclear in 1982 when the current research program was being planned. Even in 1986 Moskowitz noted that there was still very limited evidence for the efficacy of drug education to generalise from tobacco use behaviour to alcohol and other drugs. A number of researchers pointed out that smoking prevention programs had only been successful within a climate of rising social disapproval of tobacco use (Ellickson et al., 1988; Flay, 1985). The review of the drug education literature conducted in this chapter suggests that a number of productive and counterproductive program components and implementation principles can be identified; but no integrated model

of drug education that incorporated these principles has been adequately developed, and trialled either in Australia or overseas.

6.8 The Identification of Educational Principles that can Act as Guidelines for the Implementation of the Current Model

The purpose of this chapter has been to examine a range of educational and implementational principles and strategies that have been used by drug educators. Table 6.1 provides an overview of several review studies and meta analyses from the mid seventies up to the 1988 Bangert-Drowns study, and for a more detailed account of drug education to date these articles should be consulted. These studies identify the early problems of ineffective and counter-productive approaches, inadequate methodology and lack of clearly specified goals and objectives. It was not until the 1986 meta-analysis, conducted by Tobler, that convincing review evidence emerged to indicate that drug prevention programs had been effective, at least with tobacco use. The situation during 1982 and 1983 when this study was beginning was still far from clear and in Australia, at least, no discernible theoretical framework of drug education had been formulated and empirically tested.

The conceptual basis for the development of a drug education program has been described in preceding chapters. In order to maximise delivery of the program, and to avoid the use of counterproductive methodological and implementation approaches, important educational principles and strategies have been examined. Figure 6.1 identifies a number of educational principles drawn from this chapter's review of drug education. These principles can be used as guidelines for the implementation of a drug education program

Table 6.1 The Effectiveness of Drug Education 1967-1986: A Selection of Review Studies

Authors	Date of Review	Conclusions Regarding Effectiveness and Methodology
Berberian Gross Lovejoy Paparella	1976 (late 60's and early 70's)	The authors reviewed 27 studies and found only 5 studies having acceptable experimental design. Eight studies used only subjective evaluations, 7 studies failed to address drug use. There was a lack of comparison groups and only 2 out of 27 studies found tendencies towards reduced drug usage.
Braught Follingstadt Brakarsh Berry	1973 (1970-1972)	Early reports relied mainly on participant satisfaction and authors concluded that there was no empirical evidence regarding program effectiveness.
Randall Wong	1976 (1967-1976)	A review of over 200 published accounts of drug education revealed only 23 have conducted systematic evaluation, with only 15 reporting use of pre and post test designs coupled with comparison groups. The authors concluded that it was rare to find studies which could point the way to the future.
Goodstadt	1980 (1970-1980)	A review of 15 studies reporting negative effects found few studies were free of major experimental design flaws. Nine studies showed some positive findings but problems difficult to determine cdifficult to determine clearly what was happening. Goodstadt recommended that evaluation measures should, in future, match stated objectives.
Kinder Pape Walfish	1980 (1968-1977)	A review of 19 studies indicated that for the most part programs had been ineffective in decreasing substance abuse or preventing future abuse. The majority of studies suffered from major methodological faults.
Schaps DiBartolo Moskowitz Palley Churgin	1981 (1968-1977)	The authors reviewed 127 primary prevention studies. Results indicated that only minor effects on drug use and attitudes could be found. Only 10 out of 127 studies met the criteria in terms of program intensity and research methodology to be considered adequate and only 4 out of the 10 studies employed drug use measures; only 2 of these studies found positive impact on drug use. Family relationship ubuilding strategies and alternatives programs appeared to offer the most promise.

Table 6.1 (continued)

Authors	Date of Review	Conclusions Regarding Effectiveness and Methodology
Hanson	1982 (1970s-1980)	Over 90 studies were reviewed. A number of studies reported changes in knowledge and some in attitudes; but in terms of the most rigorous test of effectiveness, subsequent drug use, the vast majority had no effect; a few studies reported decreased drug use but other studies reported increases following drug education.
Tobler	1986 (1980-1985)	Tobler conducted a meta-analysis of 143 secondary drug prevention studies and concluded there was substantial evidence to show that cigarette smoking prevention programs could reduce tobacco use. Tobler concludes that knowledge only and affective only programs are ineffective. Behaviour refusal skills training employing peer leaders and alternatives to drug use approaches appear to offer the most promise. Recent theoretical moves towards emphasis or skills training and away from a focus on attitude change has been beneficial.
Bangert-Drowns	1988 (1968-1984)	Outcomes of 33 evaluations were examined statistically.The meta-analysis indicated that positive effects on knowledge and attitudes usually occurred with typical substance abuse education programs. Attitudinal effects were slightly higher when peers were used as leaders. Drug use behaviour was considerably harder to change but nevertheless students who had volunteered to participate in drug education did report lower drug use behaviour at follow up. The study examined effect sizes.

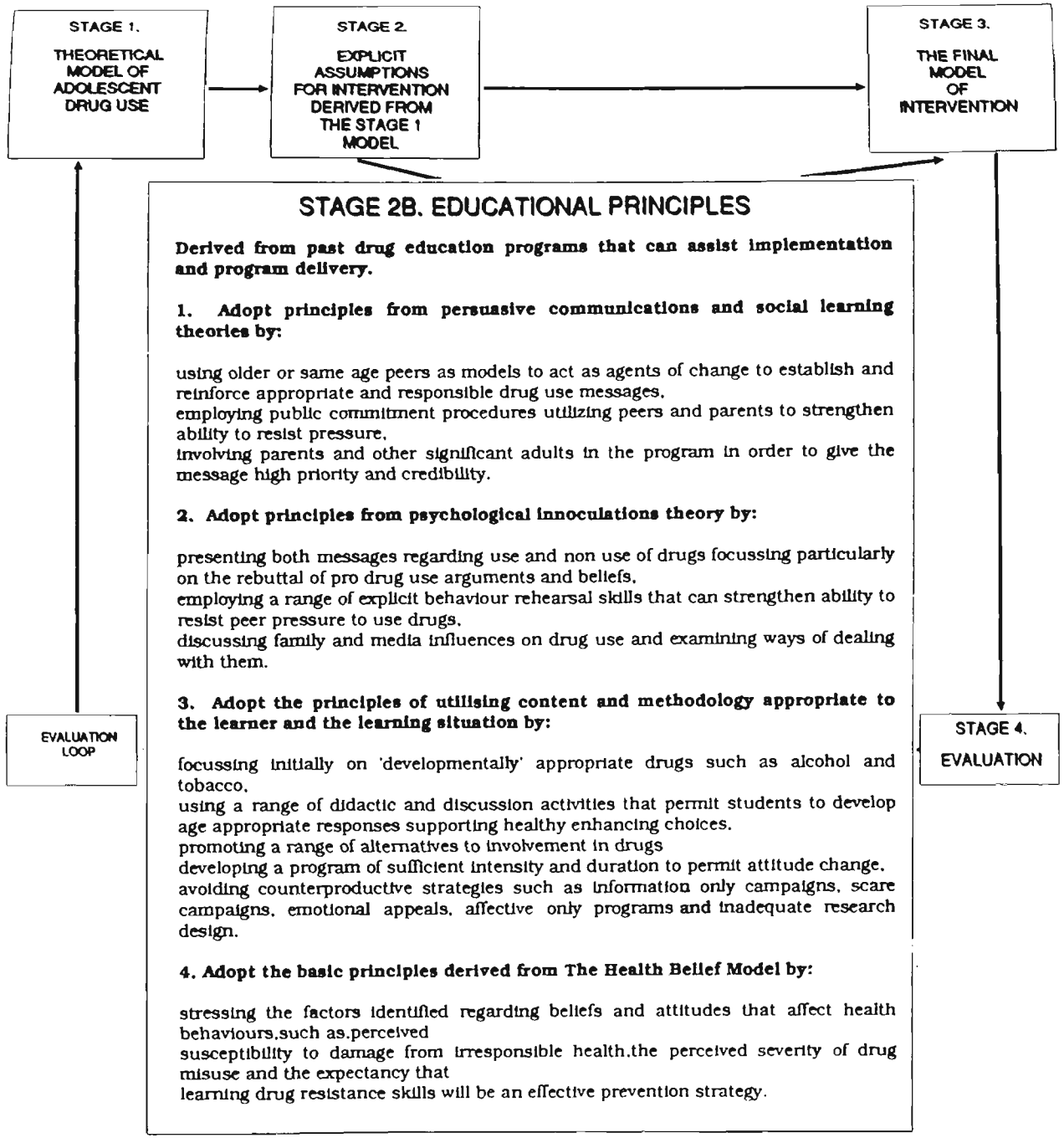


Figure 6.1 The identification of educational principles that can assist in effective implementation and delivery of a drug education program.

based on the psychosocial developmental influences model. As the various stages in the model building process are made explicit, each stage is also placed into the same model building theoretical framework. Figure 6.1 permits this perspective to be maintained. The model now provides a conceptual foundation, which identifies the essential nature or content of a drug education and prevention program. The educational principles expressed in the form of a set of implementation strategies and guidelines (Figure 6.1) can now assist in the translation of theoretically derived assumptions, regarding the nature of drug education, into a classroom program.

A number of guidelines for implementation have been taken from persuasive communication theory, social learning theory, psychological innoculations theory and the theory of reasoned action. Each of these theories contribute to the overall structure and implementation of drug education programs by providing a number of valuable insights into the way that attitude and behaviour change can be most effectively accomplished. Many of the later program developers became cognisant of the fact that adolescent drug taking invariable occurred within a social context and this fact led to the introduction of peer-led drug education programs. The employment of peer program leaders as an educational strategy complements the findings from aetiological research, regarding the importance of modelling and of social learning influences. The use of same age or older peers as significant others, alongside teachers and parents, adds credibility and a high profile to the establishment and reinforcement of antidrug use messages. Messages regarding non use or minimal use of certain drugs can also be reinforced by a psychological innoculation

approach that provides young people with a range of rebuttal skills and arguments.

The teaching of explicit behaviour rehearsal and peer resistance skills should in the first instance be applied to the use of legal drugs. The timing of a drug education program should be prior to the rapid onset of drug use in adolescence; and legal drugs are the most appropriate focus at this developmental stage. Programs also need to be of sufficient intensity and duration to bring about attitude change. They need to challenge perceived normative beliefs regarding health threatening use of drugs and alcohol and to promote a public commitment to health enhancing minimal drug use behaviour.These programs need to be as methodologically rigorous as possible and they should also avoid counter productive strategies such as scare tactics, emotional appeals and affective only or information only approaches.

It is important that any model of intervention is cognisant of past drug education research that examines implementation and program construction principles. Once these educational principles are integrated with the implications for intervention derived from the psychosocial developmental influences model, the final stage of the model can be completed. The final model of drug education, along with a number of explicit assumptions or hypotheses regarding outcome, are now the only steps that remain to be completed.

Chapter 7: The Specific Nature of the Program and Its Evaluation

The preceding chapters have examined a set of important theoretical and empirical findings from which explicit assumptions about the nature of this intervention can be derived. The model building process has combined perspectives from developmental, aetiological and educational frameworks into an overall intervention model. The relevant educational principles, identified in the previous chapter, have been integrated with developmental and aetiological considerations in order to complete the final intervention model which can now be implemented within a classroom setting. Figure 7.1 identifies the final components of the intervention model that should comprise the drug prevention program. Once again a model building perspective has been maintained and the final program elements are specified in stage three of the model. The actual program has been published (Wragg, 1985) and specific details regarding the lesson units and procedure adopted have been outlined in the next chapter.

The aims of this research are firstly to provide a specific model of drug education based on a clearly developed conceptual framework, and secondly, to test the effectiveness of that model to bring about change in the drug taking habits of adolescents. A set of evaluation hypotheses is therefore outlined below:

7.1 Evaluation Hypotheses

Subjects who have been included in the drug education intervention (intervention group) program would, in comparison to non-participant peers (non-intervention group), be expected to:

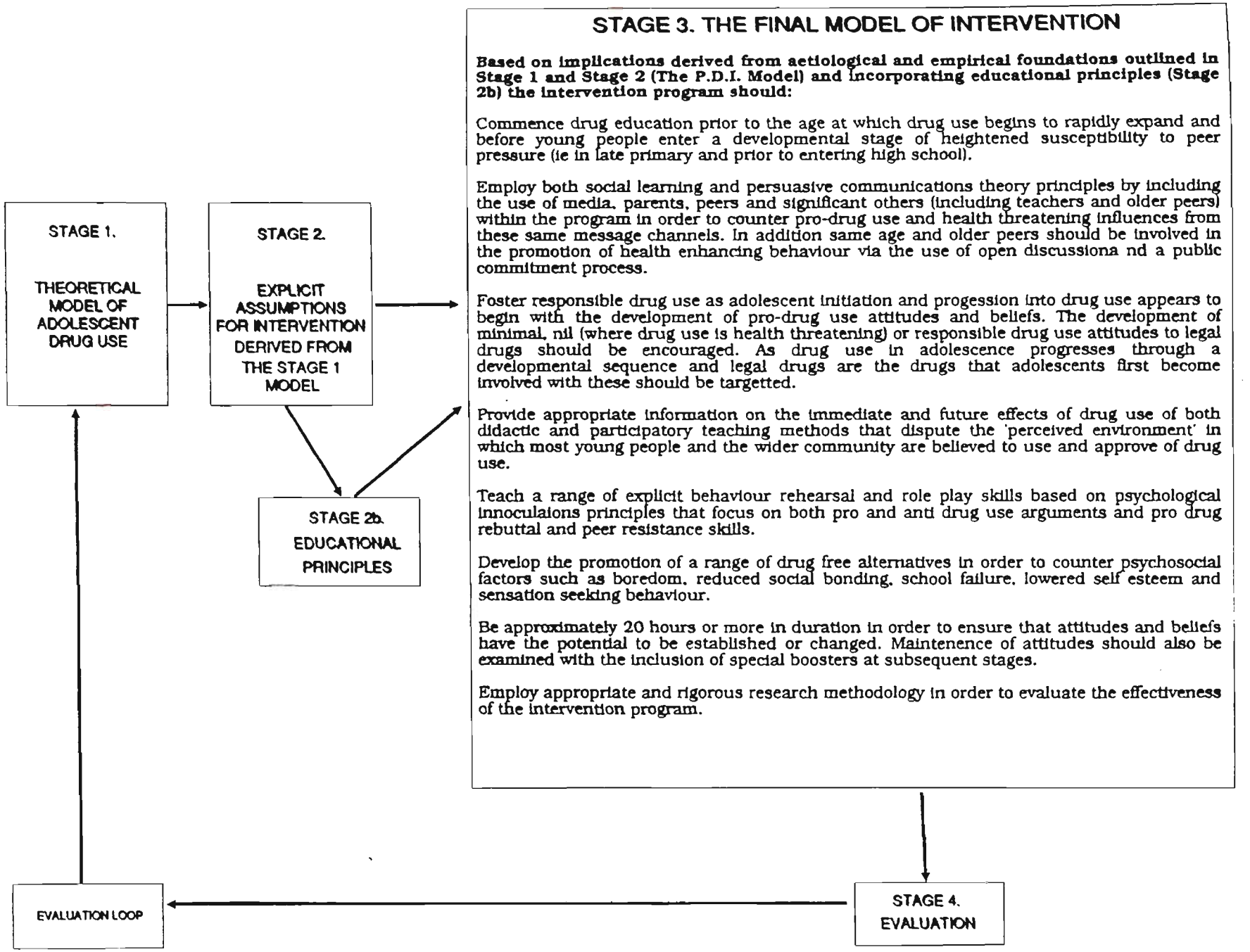


Figure 7.1 A model of intervention for drug education based on the psychosocial developmental influences (P.D.I.) model of adolescent drug use and incorporating relevant educational principles for intervention

Hypothesis 1. Oppose pro-drug use beliefs and hold attitudes that would generally support either a moderate or minimal (where drug use is health threatening), and health enhancing level of drug use behaviour.

Hypothesis 2. Show drug use behaviour that will reflect a more moderate limited or minimal level of drug use in terms of:

(a) reduced incidence of use for commonly used drugs;

(b) reduced frequency of use for commonly used drugs;

(c) reduced levels of use for commonly used drugs;

(d)* reduced levels of subsequently derived effects from the use of the most commonly used substance (alcohol).

The development of attitudes and behaviour supporting moderate or minimal drug use and opposing drug use that could be deleterious to health would be expected to have a positive effect on the degree of progression towards illegal drug use. Program participants should therefore not exhibit the same levels of illegal drug use as their counterparts in the non-intervention group. As marijuana is, in fact, closest to legal drugs in terms of a development progression it would be expected that usage of this drug would best indicate the success or otherwise of the program in relation to illegal drug use.

Hypothesis 3. It would therefore be anticipated that, in comparison to the non-intervention group, intervention group subjects would show a reduced incidence of illegal drug use, particularly with regard to marijuana use and, to a lesser extent, to the use of other illegal substances that are further along a developmental progression of drug use.

* hypothesis 2(d) pertains only to the use of alcohol

Hypothesis 4. It would be anticipated that subjects who participated in the intervention program would, in comparison with the non-intervention group, have a delayed age of drug use onset for alcohol use, tobacco use and marijuana use.

Hypothesis 5. Intervention subjects, in comparison with non-intervention group subjects, would be expected to indicate greater ability to resist peer group pressure to use drugs.

Hypothesis 6.

(a) Subjects who become involved in alternatives such as sports or hobbies would be expected to show reduced levels of drug use in comparison with individuals who do not participate in alternatives.

This hypothesis may be developed further in relation to an interactional effect between engagement in alternatives and intervention group status.

(b) It is hypothesized that subjects who have participated in the intervention program, and who also engage in alternatives. would show reduced levels of drug use, in comparison with individuals who did not meet both criteria.

Final Research Question

Because the link between attitudes to drug use and drug use behaviour are not always clear, the last research question focusses on an examination of these relationships from a changing developmental

perspective. It would generally be anticipated that subjects who are non-users of a particular drug would hold attitudes to drug use that are different from drug users. It is not clear how these attitudes to drug use would change as non users move into drug use. The final question is not framed as an hypothesis, but as an exploration of the changing relationships between attitudes to drug use and drug use behaviour that might exist as individuals move from non-use to use of specific drugs.

In the past many drug education programs failed to identify or develop a relationship to any theoretical framework or body of coherent research. Because specific issues regarding theoretical formulations were not addressed, the research evaluations obtained from the few programs that had been evaluated often failed to contribute to the ongoing development of any specific model of drug education. The evaluation of the intervention program can complete the final step in the model building process, as a feedback loop can be provided to the original theoretical foundations on which the program is based.

Chapter Eight: Method

This chapter provides information on the nature of the intervention program, implementation strategies, the selection of subjects and intervention design. Issues regarding the nature of drug use measurement are also examined following a brief description of a pilot project in which evaluation instruments were trialled and refined in order to produce an attitude scale and a questionnaire examining drug use behaviour.

8.1 A Description of the Intervention Program

The format and content of the drug education program derived from the final model of intervention and presented in the previous chapter (Figure 7.1) is elaborated in Table 8.1. The complete drug education program comprised four sections or stages. The first stage contained six information and discussion modules. These were presented to the participants by the researcher and the class teacher.

The six unit teaching component was designed to increase awareness of drug use from a psychosocial perspective and to develop students' awareness of social, media and peer pressure to use drugs. Students also investigated alternatives to drug use and learnt skills of systematic decision making and methods of coping with peer pressure. Lesson units and resource material used for the program had been published by the New South Wales Department of Education (Wragg, 1984).

Table 8.1 Intervention Program Objectives and Format

Component One: Teaching Unit

Teaching Modules examined the social basis for understanding alcohol and drug use in society, alternatives to drug use, awareness of peer and media pressure, decision making and values clarification exercises.

Objectives for Component One

* To increase student's understanding of basic human needs and to provide a psychosocial context from which to understand drug use.
* To develop student skills at systematic decision making.
* To teach alternative methods for handling life problems and consequent stress.
* To sensitize students to social, media and peer pressure and to provide skills training in resisting peer pressure to use drugs.

Component Two: Student Responses

Students were asked to work in groups and formulate a response to what was previously learnt. The nature of the response was a group video, healthy lifestyle newspaper teaching unit for other children or alternative advertisement for pro-healthy lifestyle behaviour.

Objectives for Component Two

* To provide opportunity for students to personalize and discuss the issues surrounding adolescent drug use and misuse.
* To encourage students to develop a pro-healthy lifestyle stance within the context of peer discussion and peer validation of appropriate decision making.
* To develop a resource that can be used for peer led discussion and subsequent reaffirmations of decisions.

Component Three: Public Commitment and Peer Led Discussion

Student groups present videos, art work, or newspaper articles written, produced and portrayed by group members. Presentation is to all other grade groups, to teachers and to parents. Students conduct their own session and debrief audience regarding the purpose of their video, etc. Students make a public commitment to their stance.

Objectives for Component Three

* To establish a set of pro-healthy lifestyle anti-drug use norms within the confines of each individual's current community (e.g., family, friends) and school.
* To affirm the commitment to a pro-healthy lifestyle stance across peer linkages.
* To open up the topic of drug use across family, school and friendship or peer boundaries.

Component Four: Subsequent Component

Students' videos and art work are kept for 12 months and as older students drug education program participants return to show their videos to younger peers (i.e. Grade 7 returns to show Grade 6). Students reaffirm and debrief as before.

Objectives for Component Four

* To offer a peer led/peer influences section as part of the program.
* To reinforce peer norms.
* To act as a booster session for past program participants.

The second phase of the program involved students in making their own group responses to the teaching units previously presented. Responses were selected from the following list:

. an advertisement for a drug free healthy lifestyle,

. a videotaped play that demonstrated how to cope with peer pressure,

. a documentary style investigation of drug use.

The objective at this stage was to personalise awareness of appropriate drug and alcohol use behaviour within the context of peer discussion and validation of health enhancing behaviour.

The third component was a public commitment and presentation stage. It involved students in a peer led discussion of each group's response video or artwork. At this stage parents, teachers and all grade peers were involved as the audience and as participants in discussion. Parents had previously been involved in a two session program that was run concurrently with the student program. The display of videos and artwork became the third and final parent session. The objective at this stage was the establishment of a public commitment to a pro-healthy lifestyle stance in which the use or misuse of substances that could be injurious to health was discouraged by both parents and peers. Participants presented their videos and artwork to parents and peers and they debriefed and discussed their presentations. Students were asked to indicate their own beliefs regarding current and future drug use during this process.

At the conclusion of the third stage a total of 20-30 hours of program time had been expended. The fourth and final program

component took place one year after the conclusion of the program at stage three. Videos, art work or other material were kept, and one year later students in the original program returned from Grade 7 in high school to present their videos and art material to the new students (now in Grade 6 in primary school). These returning students were now one year older and they acted as peer leaders in demonstrating and debriefing their responses to last year's program. The final stage served two purposes. New program participants experienced positive peer influence following the presentation by older peers and in addition the older peer group were reminded of their original commitment and previous learning was reinforced.

The program employed aspects of psychological innoculations theory and persuasive communication theory (McGuire, 1974) and incorporated discussion and logical argument regarding drug use. Teachers, parents, older peers and the researcher were involved in the program as credible and significant sources of communications. The skills necessary to resist social influences (family, peer and media) to use alcohol, tobacco, self medication and marijuana were examined and modelled. Direct instruction, coaching and feedback were also given to students practising refusal skills.

8.2 A Pilot Program

In 1980 a pilot phase of the program (Wragg, 1986) had taken place, and older peers returned from high school to introduce the first wave of new students, in the present research, to the program. The pilot program was conducted in order to both trial the program material, and develop appropriate measurement instruments. A pre and post test

intervention and non-intervention group longitudinal design using 63 students (Intervention and Non-intervention) aged between 11 and 12 years was conducted in the same geographical area within one large primary school. Students were followed up only once after the post test, approximately three years after the conclusion of the intervention phase in Grade 6. The results of the longitudinal follow up survey indicated that intervention group subjects as compared to non intervention group subjects had reduced levels of drug use, lower pro drug use attitudes and were better able to resist peer pressure. A trial of materials and instruments employed in the research provided valuable data with which to revise and rework the measurement tools and improve the teaching program. A process evaluation of the teaching program also indicated a need to improve the structure of the program and reduce the time between sessions in order to obtain a more evenly flowing presentation over a shorter and more concentrated duration.

8.3 Design and Sampling Procedures

A pre and post test intervention and non-intervention group longitudinal design was employed in this research. Subjects were followed up for 4 years in order to evaluate the impact of the drug education program to change attitudes and drug use behaviour. This design cannot be categorized as a true intervention design because of the absence of randomization (Campbell & Stanley, 1966). While pure experiments within laboratory settings have certain standards of rigour which can enhance internal validity, they are deficient in terms of external validity regarding applicability across settings and populations. Inferences from the data may need to be appropriately limited in character, especially with regard to making causal inferences; but as

Cook and Campbell (1976) point out, "it is unrealistic to expect that a single piece of research will effectively answer all of the validity questions surrounding even the simplest causal relationship" (p.245). Even though the results of quasi experiments are harder to interpret than true experiments they are more feasible in clinical settings and should permit greater generalisation of data to the field setting.

A flow chart identifying each program stage is presented in Figure 8.1

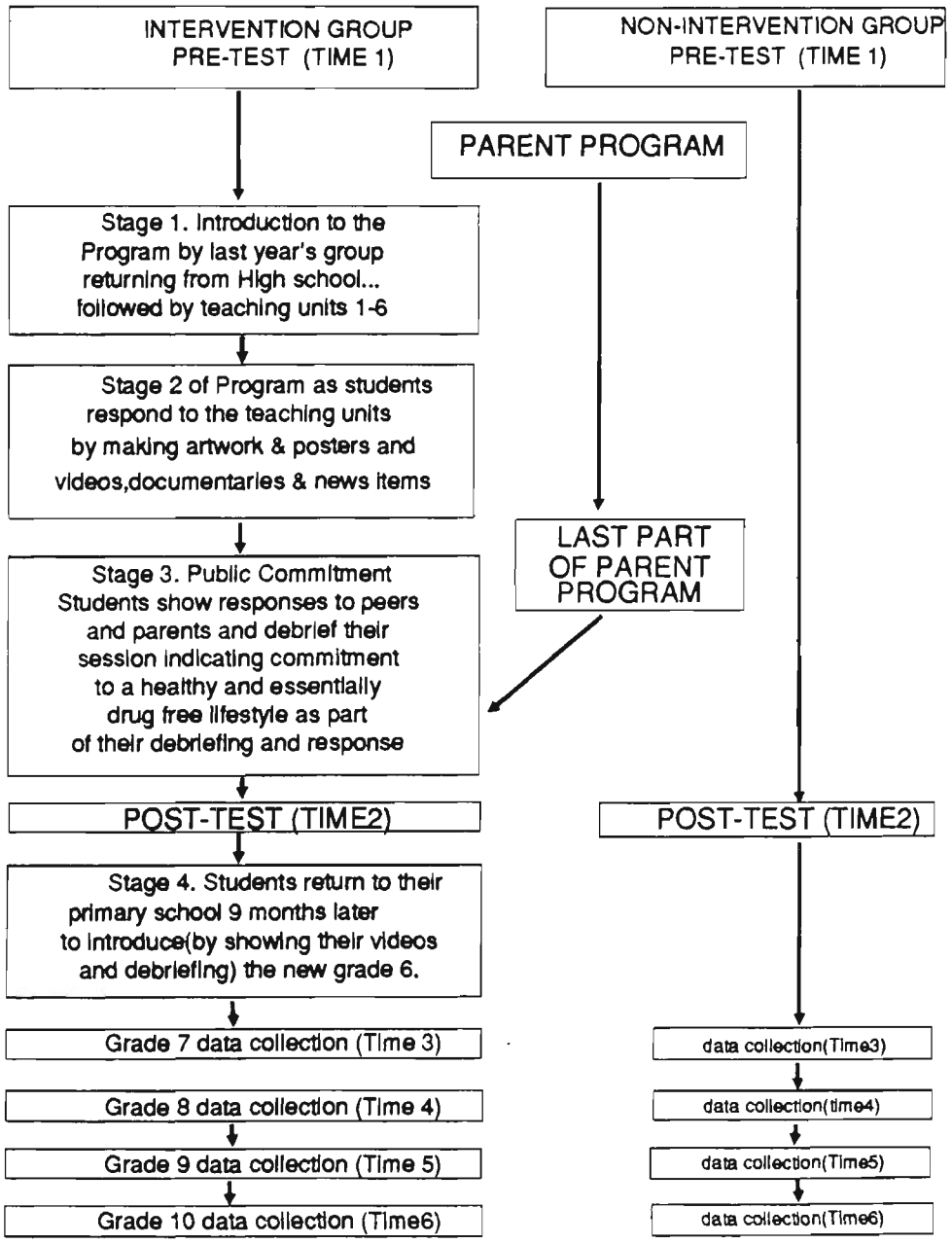


Figure 8.1 Flow of program stages and data collection

Further information regarding the timing and duration of the complete research program is contained in Table 8.2.

Table 8.2 Timing and Duration of the Drug Education Research Program

Duration of study	$4\frac{1}{2}$ years (defined as the time between Pretest(Time1) and the final data collection in grade 10 (Time6)
Grade at time of first sampling	Grade 6
Year of first contact	1983 (1st wave) 1984 (2nd wave)
Year of last contact	1987 (1st wave) 1988 (2nd wave)
Number of data collection stages	6
Interval between data collection	Pretest Time1 to post test Time2 7 - 8 months Time2 to Time3 10-11 months Time3 to Time4 11-12 months Time4 to Time5 11-12 months Time5 to Time6 11-12 months
Approximate length of time taken for intervention program	30 hours
Approximate length of time taken for parent program	5-6 hours

A total of 619 subjects (male and female) participated as intervention or non-intervention group subjects at the pre test stage. Seven primary schools agreed to participate and were assigned to either non-intervention or intervention conditions after discussion and agreement with principals was reached. All Grade 6 students in the selected schools received parental consent to participate in the study. Schools also made a commitment to participate in all program intervention and evaluation procedures. Primary schools were chosen from the same school district and three schools (2 intervention and 1 non-intervention) proceeded to one high school and the remaining four primaries (2 intervention and 2 non-intervention) proceeded to another high school.

A total of 363 students participated in the intervention program and subsequent data collection stages (intervention group), whilst a further 256 students were assigned to a full data collection, non-intervention group. Four primary schools were assigned to a full testing and treatment group (intervention condition), and three primary schools were assigned to a full testing no treatment group (non-intervention condition) for a duration of two years, thus permitting the program to take place in the same schools in successive years. Data obtained from both the first and second waves were combined for the purpose of statistical analysis.

Information regarding occupational status of parents was collected at each time interval and responses were classified into six major socio-economic status groups as determined by the Department of Sociology Research School at the Australian National University (Broom, Duncan-Jones, Lancaster-Jones & McDonnell, 1977). The results of this response classification (Table 1 in Appendix 1) indicated no significant differences between intervention and non-intervention groups at any of the data collection points.

8.4 Measurement: Choice of Questionnaire Methodology

The most common methodology employed in epidemiological studies and research into adolescent drug use is the self report questionnaire. Self report questionnaires have been used in most major surveys overseas (Johnston & O'Malley, 1985; Smart, Adlaf & Goodstadt; 1985) and in Australia (Baker, Homel, Flaherty & Trebilco, 1987; Wilkes, 1987). According to Johnston and O'Malley (1985) and Smart et al.,

(1980) the use of self report questionnaires has both advantages and disadvantages. Their advantages are as follows:

1. The administration of questionnaires to clustered samples provides considerable economy in terms of cost and time.
2. More accurate estimates of prevalence and trends plus a greater ability to conduct subgroup analyses as a result of lowered costs permits data collection to occur on a larger scale.
3. The degree of anonymity obtainable in large groups in which relative confidentiality can be assured is generally much greater than that which is achieved by other methods. If confidentiality rather than anonymity is to be provided (as in the case of longitudinal studies) this can still be convincingly accomplished (Johnston & O'Malley, 1985; Johnston et al., 1982a).
4. The rate of nonresponse to the questionnaire among those present is often under 1 percent (Johnston et al., 1982a).
5. An important consideration with young people answering sensitive questions about drug misuse or illegal drug use is that the proximity of parents and other family members is not a factor.

Potential limitations of self report questionnaires include the exclusion of students who have left school, who may be absent on the day of the survey and who may be outside the age range to be students. Concern has been raised that absentees and early school leavers report greater drug use than current school students (Johnston, 1973; Kandel, Logan & Raveis, 1982). According to Johnston and O'Malley (1985) the "non coverage of absentees and dropouts has only modest implications

for the estimations of overall prevalence rates, and rather little implication for the estimation of trends in prevalence" (p.52). It is important to note the fact that this research is not directly concerned with establishing population estimates, but rather with measuring the relative rates of change in drug use behaviour between intervention and non-intervention groups. It would be anticipated that the effects of absenteeism or attrition would be distributed fairly evenly across the whole sample. The potential limitation of subject loss was not therefore considered to be a significant problem.

8.5 Validity of Self-Reported Data

A number of factors can affect the validity of self-reported data (Harrell, 1985):

1. factors in the mode of enquiry such as degree of anonymity or confidentiality;
2. failure to provide accurate information because the respondent never knew or has forgotten the answer; and
3. response bias such as an unwillingness to present information without attempting to answer in a socially favourable way by either under or over reporting.

Because there has been concern about the degree to which respondents may not tell the truth, or the possibility that misunderstandings or misinterpretations could occur, a variety of methods have been employed to assess the validity of self-reported data. Methods include asking questions about fictitious drugs (Baker et al., 1986; Directorate of Drug Offensive Survey, 1990), comparing prevalence rates of drug use with other surveys, collecting biological information

about individual drug use by the use of saliva or urine tests (Biglan, Nautel, Ary & Thompson, 1983; Flay et al., 1985), or through what has become known as the bogus pipeline (Evans, Hansen & Mittelmark, 1977; Jones & Sigall,1971; Murray, O'Connell, Schmid & Perry, 1987). The bogus pipeline procedure tries to convince subjects that their self reported drug use behavior can be independently verified by the researcher with reference to some form of bogus objective measure.

It would appear that biochemical testing validation procedures generally add very little to that which has already been gained through the use of private and confidential assurances to respondents (Akers, Massey, Clarke & Laver, 1983; Baker et al., 1986; Gold, 1977). Evidence from the analysis of survey data also indicates that the prevalence of self reported use of non existent drugs is low, and probably in the order of between 1% and 2% (Directorate of Drug Offensive Survey, 1990; Baker et al., 1987; Smart & Jarvis, 1981). For a number of years the use of the bogus pipeline method was accepted practice in some studies,but a number of researchers have either reported no differences in self reported smoking rates between students assessed under pipeline and non pipeline conditions, or have failed to replicate the pipeline effects (Akers, Massey, Clarke & Laver, 1983; Bauman, Koch & Bryan, 1982; Hansen, Malotte & Fielding, 1985; Werch, Hall & Lundstrum, 1989). Murray and Perry (1987) concluded that when anonymity and confidentiality are assured, disclosure of cigarette and marijuana use was just as high without the pipeline.

The overall conclusion reached after reviewing all the evidence regarding the validity of self completed drug use surveys is that little is gained from using other measures, that may not already be achieved

through convincing respondents of the privacy and confidentiality of the survey (Baker et al., 1987; Directorate of the Drug Offensive Survey, 1989, Johnston & O'Malley, 1985; Needle, McCubbin, Lorence & Hochhauser, 1983). The general consensus of opinion regarding the accuracy of drug use self reports is that when appropriate conditions of confidentiality and administration are adhered to, the vast majority of students give accurate accounts of their recent drug use (Barbea, Rahav & Teichman, 1987; Mensch & Kandel, 1988; Reinisch, Bell & Ellickson, 1991). In view of the substantial research evidence suggesting that students are willing to provide accurate and valid self reports, and because of the advantage of time, cost and relative confidentially that could be provided a questionnaire methodology was chosen.

8.6 Development and Reliability of the Self Report Questionnaire

The high school questionnaire included a self-report drug use section preceded by a number of demographic questions and an attitudes to drug use scale. Drug use questions were grouped together according to six categories of drug use, namely alcohol, tobacco, painkillers (analgesics), cannabis, inhalents and a final category of illegal drugs or prescription drugs used illegally (sedatives, stimulants, hallucinogenics and narcotics).

Drug use prevalence questions conformed to the standards suggested by the World Health Organisation's recommended methodology for student drug use surveys (W.H.O., 1980) and the Commonwealth Department of Health (1981). Students were required to indicate on a five, six or seven point scale the number of times they had used a drug during their lifetime in the last twelve months, last month and last week. The use of a standardised instrument permits

comparisons to be drawn with surveys conducted in Australia (Baker, Homel, Flaherty & O'Malley, 1986), and in the United States of America (Johnston, Bachman & O'Malley, 1982), as well as other countries that adopt the W.H.O. recommendations. A total of 34 questions including core demographic items was used in the first section of the high school questionnaire. The second section contained an attitude scale plus other questions regarding participation in sports and hobbies and an assessment of success or failure in resisting pressure to use or misuse certain drugs. A copy of the complete instrument is included in Appendix 1.

Reliability estimates for the self-report drug use section were calculated in order to obtain a measure of the instrument's measurement consistency. Although reliability can be estimated in several ways the most widely used approaches examine test-retest reliability and internal consistency. Drug use behaviour may change rapidly during a period of two to four weeks, and because of this problem test-retest stability coefficients were calculated on drug use behaviour questions that would not normally change within a short period (eg., ever smoked, ever used marijuana, use during the last 12 months).After a gap of 5-6 weeks a test-retest coefficient of .72 was obtained and this provides an acceptable level of reliabilty.

The most commonly described measure of reliability examined by research studies is the consistency of responses to all items in the scale. Internal consistency is frequently indexed by Cronbach's coefficient alpha (1970), which is the average of all possible split halves and provides an index of item homogeneity (Cronbach, 1951; Nunnally, 1978). Although slightly different reliability coefficients occur at each

grade, a consistent picture for each of the four major drug use scales (alcohol, tobacco, analgesics and cannabis) emerges. Alpha coefficients for the four major drug use scales used in the questionnaire are generally between .80 and .85 and within acceptable limits (Nunnally, 1978; Shaw and Wright, 1967). Internal consistency analyses for each of the drug use scales are contained in Table 8.3.

Table 8.3 Internal Consistency Analyses (Cronbach's Alpha) for the Attitude to Drug Use Scale and Self Reported Drug Use Behaviour Questions

	Grade 7	Grade 8	Grade 9	Grade 10
Attitude Scale (15 items)	.86	.85	.86	.86
Alcohol Questions (4 items)	.80	.81	.82	.86
Tobacco Questions (3 items)	.86	.79	.88	.92
Analgesics Questions (2 items)	.78	.81	.79	.81
Marijuana Questions (2 items)	.82	.89	.91	.88

8.7 The Development of the Attitude Scale

The attitude scale was originally developed from a pool of 25 questions derived from developmental and epidemiological considerations and social learning and drug use theory. Jackson (1971) suggests that the development of a scale must proceed from a pool of items derived from knowledge about the topic or trait in question. Questions examined attitudes to commonly used drugs and their use or non use in a range of peer or social pressure situations. The original pool of 25 items was reduced to 15 following item-scale analyses regarding response homogenity and stability. Items with low correlations to the total scale,or

items that appeared to have little or no discriminatory power, were removed. Means and standard deviations for each of the 15 scale items, along with corrected item-total correlations for each item to the complete scale, are reported in Table 2 in Appendix 1. Correlations range generally between .30 and .60 for each of the items in relation to the total scale.

The reliability estimates (Cronbach's alpha) for the attitude scale examined across all grades clustered around .85. Each of the analyses was conducted separately for each grade at school. Alpha coefficients are reported in Table 8.3. The levels of internal consistency meet the criteria for scales to be used for research purposes (Nunnally, 1978; Shaw & Wright, 1967). A test-retest correlation of the 15 item attitude scale was calculated at .68 using a separate sample of 78 subjects aged 12 years who were retested after a 5-6 week interval. This is quite low by some standards, but as Ghiselli, Campbell and Zedeck (1986) state, it is often difficult to maintain higher reliability when the time interval between test administrations is quite large. It could also be expected that, as the sample chosen are at an age where attitudes are still fairly fluid, such changes might be expected.

A principal components analysis of the attitude scale confirmed the homogeneity of all items as almost all items, in the correlation matrix at each separate year analysis level were significantly correlated at the p.= .0001 (1 tailed) level (Table 3 of Appendix 1). Bartlett's test of sphericity (ranging from 274 to 1227 across all four years, sig=.000) and the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO ranges between .75 and .85) indicate that a factor solution may be examined, as strong relationships exist between items in the scale. The principal

components analysis consistently identified three factors across all separate grade analyses and the first factor identified included all 15 attitude scale items.

A principal components analysis generally provides an empirical summary of the data set and the first principal component identified is the linear combination of observed variables that separates subjects by maximizing the variance of their components scores (Tabachnick and Fidell, 1989). The second and subsequent components are formed from residual correlations and contribute considerably less to the variance explained.

Across all four years of analysis (high school grades 7 to 10) the first factor, comprising all 15 items, accounted for approximately 35% of the variance across all time sampling points. The second and third factors account for approximately 8% each (summary tables for the unrotated principal components analysis have been included in Appendix 1 Table 4). Although responses differ, the content of the second and third factors overlaps with the first factor and they cannot be regarded as factorially independent. In addition the second and third factors, identified by the principal components analysis, provides no meaningful or useful basis on which independent analysis should proceed apart from the original first factor of the total scale. Perhaps the most important reason for deciding to not use scales derived from the second and third factors, however, comes from the need to employ one stable and consistent measure throughout the duration of the study in order to examine attitude changes across time. A major problem created by accepting a multiple factor solution, in addition to what has already been said, is that both the second and third factor items changed at each

grade level. As different issues and perspectives become more or less dominant during adolescence, and because of rapid developmental changes it would be anticipated that at different stages attitudes could change. In order to track attitude and drug use behaviour correpondences and links over time however, a consistent measure is required. The most interpretable component that was stable across all age groups was the first factor comprising all 15 items. This provides an internally reliable and interpretable measure of general attitudes to drug use and social and peer pressure to use such drugs.

An adequate degree of homogeneity has been established with regard to internal reliability, but in addition the 15 item attitude scale shows acceptable construct and criterion related validity. Criterion validity deals with how well a scale can predict a specific external criterion, which in this case could be regarded as drug use. Construct validity on the other hand deals with how well a scale fulfils properties ascribed to it by a relevant theory. One aspect of construct validity that indicates how well an instrument can discriminate among groups, known to differ with respect of a particular trait behaviour, is divergent validity. The scale had previously been used in the original pilot study (Wragg, 1986), and after further refinement it was administered to a separate sample of Grade 9 adolescent users and non users of a number of common drugs. Mean attitude scale scores were calculated for users of alcohol, tobacco and marijuana and compared to those obtained from non users of these drugs. Significant differences were recorded for alcohol use ($t(221)=2.75, p<.01$), tobacco use ($t(219)=7.92$, $p< .001$) and marijuana use ($t=(221)=8.35$, $p<.001$).

8.8 Procedure

The intervention program took place during the last school term of Grades 6, and pre and post test data collection occurred approximately one week before and after the program was scheduled. The duration of the school program varied slightly but generally took between 5-6 weeks of term time and totalled between 25 to 30 hours of actual class and teacher time. The parent program lasted for 5-6 hours. Data were collected six times over four and a quarter years. With the exception of the pre and post test data collection stage spread over 7-9 weeks in Grade 6, data were collected at yearly intervals in Grades 7 (Time 3), 8 (Time 4), 9 (Time 5), 10 (Time 6).

A number of principals and school administrators in the early stages of this project did not wish to pursue questions regarding drug use that might either raise curiosity, or suggest by implication that increased levels of use of some drugs could be occurring in children aged only eleven years. As a result no questions regarding the use of inhalents or illegal drugs (with the sole exception of marijuana) were included in the pretest. The pretest questionnaire also contained the attitude scale questions, but no drug use behaviour section was included in the post-test. Time intervals (7-9 weeks) between pre and post tests were not of sufficient duration to warrant remeasurement as the vast majority of school children in the sixth grade were not regular users of most drugs. At this age knowledge and attitudes towards drug use were considered to be the most appropriate measures from which to assess the impact of the intervention program. The collection of pre test data permitted a comparison to be made of intervention and non-intervention group drug use and it also provided a baseline against which subsequent drug use

could be measured for both groups. A copy of the Grade 6 pretest questionnaire is included in Appendix 1.

Pre and post test questionnaires administered by research assistants were completed, only after consent was obtained from parents following the return of consent forms. Teachers were not present during the administration and children were asked to not talk, but to treat the situation as if it were an examination where privacy and silence were to be observed. Administrators were instructed to follow a standard introduction for each data collection session (see Appendix 1). The statement read to students emphasised the fact that absolute confidentiality and privacy was assured. Students were furthermore told that no teachers or parents would see their answers. It was essentially anonymous, as names were not to be used. A unique set of identifiers was combined at the first data collection stage and this code permitted subsequent follow up questionnaires to be matched to each subject.

Each questionnaire was given only an identifying number which was based on the sex, birthdate, school attended and number in family. It was stressed that names were not linked in any way to the questionnaires. Identification at each stage was based solely on the four identifiable pieces of information. Only a university researcher would be able to identify and match these questionnaires, and to that extent anonymity and confidentiality were assured. Questionnaires were completed in approximately 25-30 minutes and then placed into a large box which was located at the exit point well away from the administrators, who were told to pay no attention to this process. Identification, coding and computer entry of collected data were then the responsibility of the researcher or a research assistant at the university.

A number of researchers stress the importance of adhering to the kinds of techniques just described regarding privacy and confidentiality and anonymity (Gfroerer, 1985; Mensch & Kandell, 1988; Reinisch, Bell & Ellickson, 1991).

This same procedure was followed at all subsequent data collection points. However after Grade 7 collection of data followed a passive consent procedure, rather than an active consent process. Passive procedures involved mailing or sending parents written statements of informed consent, but inviting a response only if they wish their child to not be included in the study. Active consent procedures on the other hand requires parents to return a signed statement giving permission for their child to participate in research. Biglan and Ary (1985) point out that a major problem with active consent procedures is that many parents fail to respond, because they lose the form or simply forget rather than object. One of the conditions placed upon this research by the Research Unit of the New South Wales Department of Education was that active consent procedures should be applied. But because a significant number of parents failed to respond to the Grade 7 (Time 3) mailing a passive consent procedure was adopted at subsequent data collection stages. A number of researchers (Kearney, Hopkins, Mauss & Weisheit, 1983; Severson & Ary, 1983) do point out that passive consent procedures may well be superior as they may produce a more representative sample of adolescents.

The next chapter begins with an examination of attrition rates and the establishment of longitudinal and cross-sectional data sets from which an analysis of results has been undertaken. Later chapters examine the differences between intervention and non-intervention group

drug use behaviour, whereas the following chapter restricts itself to an examination of attitudes to drug use.

Chapter Nine: The Formation of Longitudinal and Cross Sectional Data Sets and Subsequent Analysis of Attitudes to Drug Use

The first part of this chapter examines levels of attrition and the subsequent establishment of two data sets identified as the longitudinal sample and the cross-sectional sample. The longitudinal sample comprises all subjects who were present and completed questionnaires at all data collection stages across the complete duration of the study. The cross-sectional sample varies in number from grade to grade, as attrition and absenteeism affect numbers, but it represents the total number of subjects, including the longitudinal sample, available at each discrete data collection stage. The second part of the chapter discusses the statistical treatment of the data and concludes with a set of analyses examining intervention and non-intervention group attitudes to drug use. Subsequent chapters focus on further examination of the hypotheses generated by this research.

9.1 Panel Loss due to Absenteeism and Attrition

All longitudinal studies experience subject loss due to attrition and absenteeism, and this study spread over four and a half years is no exception. Due to absenteeism, changing employment patterns, student transfers, or dropouts and family restructuring following separation and remarriage, subjects were lost from the project. During 1983-1985 a significant down turn in the labour force in local industry in the Illawarra Region of New South Wales occurred and many families moved away from the local area in search of work. Some returned a year or so later as economic conditions improved or the source of out-of-area jobs dried up. In addition subjects were lost at each of the data collection stages due to absence on the day of the school survey or to incomplete or invalid questionnaire responses. Absentee rates varied slightly from grade to

grade, but an average of 8% of available subjects were absent at each survey point. Because assurances of confidentiality and relative anonymity were given, subjects were asked not to identify themselves by name. In order to maintain the assurance given regarding confidentiality and anonymity absentees were not followed up after each data collection time, as contact after absence would indicate that identity could be established and linked to drug use responses. A small percentage of students (approximately 0.5%) were also lost to the study due to the elimination of completely invalid data prior to coding and computer analysis. A significant cause of the attrition between Grade 6 (Time 1) and Grade 7 (Time 3) occurred, however, as a result of the requirements placed on the study by the New South Wales Department of Education requiring active consent to be obtained. Following a significant panel loss at Grade 7, negotiation with individual principals took place and for all subsequent years passive consent procedures were used. Attrition during the remaining years was subsequently reduced and at one point returning subjects actually increased in the numbers available for cross-sectional analysis.

The combination of attrition and absenteeism meant that results to be reported are based on a reduced sample at each of the follow up stages (Time 3 to Time 6). At the cross-sectional level results are reported generally on 70% of the original sample, which represents a fairly substantial percentage of the original population when the duration of the study is taken into consideration. The sample used for the longitudinal analyses (N=239) represents 39% of the original group and thus attrition across the whole time period averages approximately 15% per annum. Table 9.1 presents a comparison of panel loss due to attrition and absenteeism for all groups. In general the loss to each of

the groups remains fairly similar with differences at each Grade collection point within four or five percentage points.

Table 9.1 Percentage of Subjects Retained From Original Sample (at Grade 6) After Losses Due to Attrition and Absenteeism.

Grade and Collection Stage	Complete Sample (N=619)	Intervention Group (N=362)	Non-Intervention Group (N=257)
Grade 6 PreTest and Post-test.(Time 1 and 2)	100%	100%	100%
Grade 7 (Time 3)	68%	66%	70%
Grade 8 (Time 4)	67%	67%	67%
Grade 9 (Time 5)	81%	79%	84%
Grade 10 (Time 6)	70%	71%	69%
Longitudinal Subset (Time 1 to Time 6).	39%	41%	35%

Attrition figures are often not reported but when they are figures between 5% and 15% per annum are mentioned for studies completed during a 2 to 3 year period. Rates have been as high as 35% per annum in some studies (Hansen et al., 1985; Josephson & Rosen, 1978; Flay et al., 1985). Josephson and Rosen (1978) comment that where studies have been required to preserve anonymity, to match by self created code numbers, and to rely on self administered questionnaires relatively high attrition has occurred.

Because the longitudinal sample is reduced in size, the results of both the longitudinal and cross-sectional samples will be reported in order to compare the nature of responses across both samples. If the results from the larger cross-sectional sample corroborate the findings obtained after analysis of the longitudinal subset, then greater

confidence can be placed in the findings and their application to a wider population. Although the cross-sectional sample does change at each of the high school data collection times, it is worth noting that 376 students (representing 61% of the original sample) have data available for five out of six data collection stages and therefore, when results are reported for the cross-sectional group, a significant proportion of that group is consistently present for almost all data collection stages. Because panel loss in this study is fairly evenly distributed between intervention and non-intervention subjects (Table 9.1), it would not be anticipated that lost information would favour or bias results for any particular group.

An analysis of differences between intervention and non intervention group subjects was conducted comparing baseline drug taking and attitudes to drug use. The major loss to the program, in terms of attrition, occurred between the Grade 6 data collection stage and Grade 7 where a combination of active consent data losses, school transfers and relocation caused subject loss. An attrition analysis comparing baseline drug taking and attitudes was conducted between subjects who were lost to the follow up and subjects who remained. No significant differences regarding baseline drug use were found between groups (Table 9.2).

Table 9.2 Attrition Analyses Comparing Baseline Drug Taking and Attitudes to Drug Use for Subjects who were lost to the Follow up After Grade 6 with Subjects who remained.

Variable	t	chi	df	p	subjects lost	subjects retained
Attitude to drug use	.35		607	.72	194	415
Alcohol used last month		2.95	2	.23	191	415
Tobacco used last month		3.8	4	.43	190	415
Analgesics used last month		1.42	3	.70	193	427
Marijuana used ever		3.27	1	.07*	192	409

* Note that subjects who remained had higher drug use than those who left.

9.2 Sex Differences

At each of the collection stages a comparison of sex distributions across intervention and non-intervention groups suggests that a fairly equal and representative picture emerges. At most grade levels male and female numbers are very similar and usually within 3 to 4 percentage points of each other, although towards the later grades more females remain in the program. Table 9.3 shows the numbers and percentages of males and females in the study at each grade.

Table. 9.3 Intervention and Non-Intervention Group Numbers and Sex Distribution for both Cross-Sectional and Longitudinal Group Subjects

Group	Intervention Group					Non-Intervention Group				
	Males		Females		Total	Males		Females		Total
	N	(%)	N	(%)	N	N	(%)	N	(%)	N
Cross Sectional Sample										
Grade 6 (Time1 & Time2) (619)	176	(47)	186	(53)	362	33	(52)	124	(48)	257
Grade 7 (Time3) (419)	122	(49)	177	(51)	239	94	(52)	86	(50)	180
Grade 8 (Time4) (413)	115	(51)	126	(49)	241	82	(48)	90	(52)	172
Grade 9 (Time5) (500)	134	(47)	151	(53)	285	111	(52)	104	(48)	215
Grade 10 (Time 6) (436)	113	(44)	145	(56)	258	87	(49)	91	(51)	178
Longitudinal Sample (N=239)	70		80		150	41		48		89

An analysis of sex differences for each drug use question, at each grade, across both intervention and non-intervention groups for the longitudinal and cross-sectional sample, would place an additional strain

on what is an already large and complex set of analyses. Because this study is not directly concerned with identifying the different patterns of drug use found at each particular age, a step by step analysis of sex differences in each drug use category was not regarded as a major focus of this research. It is, however, important to examine the nature of sex differences with regard to the responses to the drug intervention program and the identification of different drug use behaviour where it occurs. Sex differences, therefore, will be reported in Chapter 13 of this study, in conjunction with a number of other analyses of dichotomous variables. The major focus of the earlier results sections will be the comparison between intervention and non-intervention group attitudes and reported drug use for the duration of this study.

9.3 Initial Considerations Regarding Data Analysis Procedures.

The analysis of data collected across five school grades (primary Grade 6 and high school Grades 7, 8, 9, 10) can present difficulties due to the changing nature of drug use over time. As the vast majority of children and young adolescents are infrequent users of most drugs, especially in the earlier grades, the distribution is markedly skewed to represent a large number of zero responses. This is especially true for illegal drugs and drugs that are generally regarded with disapproval. Drugs such as marijuana, and to a lesser extent tobacco, are used by a relatively small number of children and adolescents in Grades 6,7 and 8. It is not until middle adolescence, when increased drug use occurs, that the nature of the distribution begins to approach normality. Histograms obtained from stem and leaf plots (Figure 1, Appendix 2) illustrate the changing nature of drug use of the four major drug groups being examined and the nature of the non-normal distributions.

Because of the changing nature of drug use, difficulties arise regarding the selection of an appropriate parametric or non-parametric test that can accommodate both the changes in distribution over time and also accurately reflect patterns of individual change. It could be suggested that difficulties in analysing the data have arisen due to the use of poor or unsuitable measures, but these difficulties arise because they reflect the actual nature of drug use during late childhood and adolescence. Because the most rigourous test of effectiveness is the ability of a drug education program to reduce subsequent levels of drug use, it is necessary to ask questions regarding levels of drug use.

The decision to use a parametric or nonparametric approach was based on the plots of expected normal values and homogeneity of variance for each of the dependent variable categories of attitudes, alcohol use, tobacco use, analgesic use and marijuana use. At the conclusion of the analyses, in which all dependent variables were examined, only the attitudes to drug use scale and alcohol use met with the assumption of normality. The remaining drug use data measuring tobacco use, analgesic use, marijuana use, solvent use and illegal drug use all failed to meet the criteria for normality and were, therefore, analysed using a non-parametric approach.

9.4 A Comparison Between Intervention and Non-Intervention Group Attitudes to Drug Use (Longitudinal Sample, N=239)

A comparison of intervention and non intervention attitudes to drug use indicated that attitudes to drug use were statistically comparable ($t(236)=-0.91$, $p=.37$) at the pre test stage. Hypothesis One indicated that significant differences between intervention and non intervention groups were expected. In order to examine the effects of the

intervention program from the post test stage through the high school years an analysis of covariance was used. To adjust for problems of non-linearity and heterogeneity in the data, Cochrane (1983) suggests that observational research studies should be concerned not only with matching, but linear regression should also be used. Pre-test scores were therefore used as the co-variate in order to control for any differences that might exist prior to the intervention.

Analysis of covariance (ANCOVA) from the SPSS-X Manova package was used in order to examine the effect of intervention group status averaging across all grades. The results indicate a significant difference between intervention and non-intervention group attitudes to drug use ($F(4,237)=38.08$, $p<.001$). Subjects in the intervention group appear to hold significantly better pro-healthy lifestyle and anti-drug use attitudes than their counterparts in the non-intervention group from the post test in Grade 6 and from Grade 7 through to Grade 10.

A comparison of group means for the attitude to drug use scale permits comparison of the attitude changes for both groups throughout the duration of the study (Figure 9.1). Attitude scale means and standard deviations for the longitudinal group (Table 9.4) and the cross-sectional group are also included (Table 1 Appendix 2). At the pretest data collection stage, both intervention and non-intervention groups were essentially the same. After the intervention phase an immediate change in attitudes occurs for subjects who participated in the education program. A drop in overall mean attitude scores of approximately 12 points occurred following intervention. High scores on the attitude scale indicate pro-drug use attitudes to the major drugs used by adolescents, whereas low scores are associated with opposition to drug use that may

compromise health or increase risk. Although there is a general pattern of escalating attitude scale scores for both groups throughout the duration of the study, at no stage do the intervention group mean attitude scores return to their pretest level in Grade 6. It is worthwhile noting that, as students become older, the standard deviation, as a measure of variability around the mean, becomes greater. This may suggest that, for a number of individuals, attitudes change quite significantly.

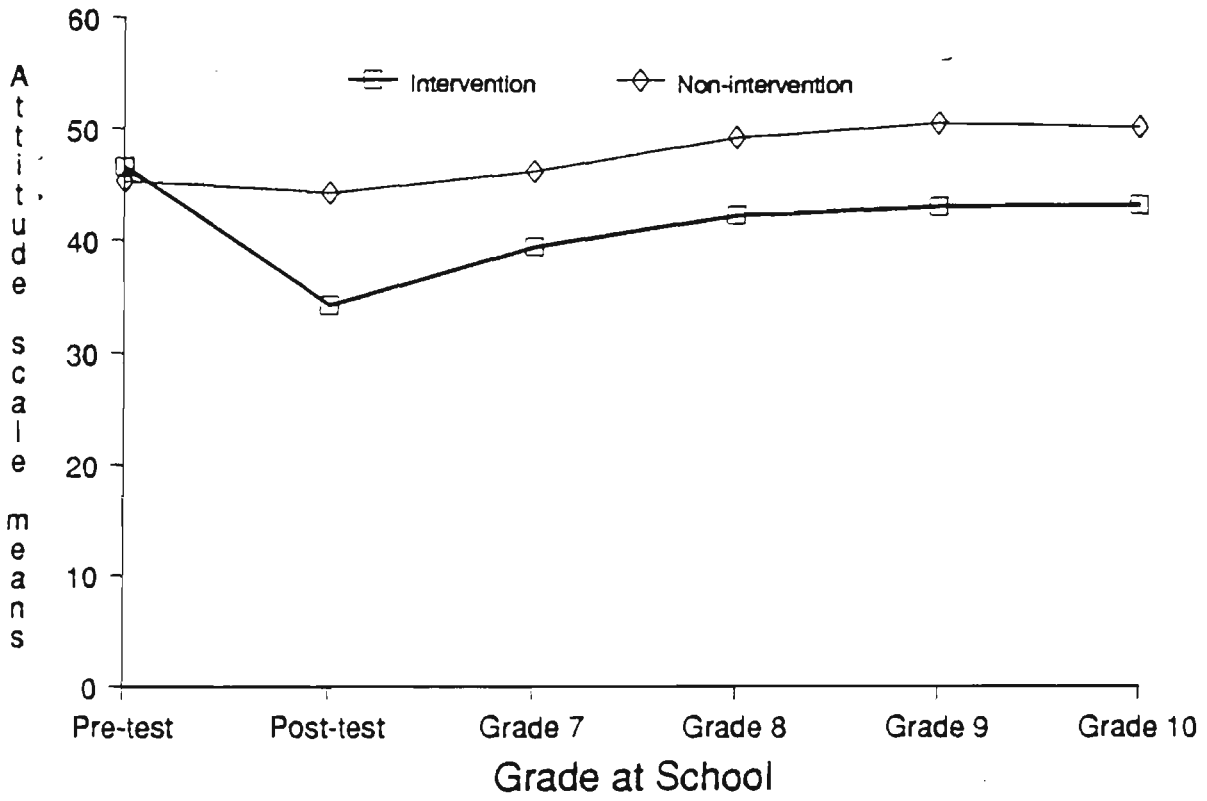


Figure 9.1 A comparison of intervention and non intervention group attitudes to drug use

A significant change to drug use attitudes has occurred with intervention, but once established, there were no other significant changes. An analysis of covariance (ANCOVA) was again used with the pre-test score as the covariate and after intervention there was no interaction between grade and group ($F(4,237)=1.56$, $p<.01$). Figure 9.1 provides a comparison of intervention and non-intervention group attitude scores and after intervention the profile of both groups remains

relatively constant throughout the remainder of the data collection stages.

Table 9.4 Attitude Scale Means and Standard Deviations for both Intervention and Non-Intervention Subjects Across all Time Periods and for the Longitudinal Sub-sample

	Non-Intervention Group			Intervention Group		
Sample	N	$\overline{X}$	SD	N	$\overline{X}$	SD
Longitudinal Sub-sample (N=239)						
Pre-test (Time 1)	89	45.26	10.15	150	46.60	10.80
Post test (Time 2)	89	44.28	9.37	150	34.23	9.00
Grade 7 (Time 3)	89	46.27	13.12	150	39.50	10.29
Grade 8 (Time 4)	89	49.40	13.27	150	42.33	11.82
Grade 9 (Time 5)	89	50.69	15.70	150	43.21	12.10
Grade 10 (Time 6)	89	50.41	14.74	150	43.39	12.96

The results obtained from these analyses suggest that Hypothesis One should be accepted and the null hypotheses rejected, as there are significant differences in drug use attitudes between intervention and non-intervention group subjects.

9.5 Further Analyses Conducted With the Cross-Sectional Sample

Because the longitudinal sample are embedded within the larger cross-sectional sample, results for both samples should be very similar. Results of analyses conducted with the cross-sectional sample will, for the most part, be confined to the appendix section. However, the major findings will be briefly summarised in each of the chapters dealing with results. At pretest intervention and non-intervention group attitudes to drug use were statistically comparable (t (607)=-0.93, p=.35). At the post test one week following the delivery of the treatment prevention program

(Time 2), there was a significant difference between the intervention and non-intervention groups in their attitudes towards drug use and to peer or social pressure to use common drugs [t (602)=13.02, p<.001]. Means and standard deviations for intervention and non-intervention group subjects are reported in Table 1, Appendix 2. A consistent pattern of differences between groups emerged across all time periods after the baseline collection point in Grade 6, with intervention group subjects holding more health conscious and anti-drug use attitudes.

A series of separate ANCOVA analyses of the cross-sectional data was conducted for each of the school years following the Grade 6 pretest, in order to compare intervention and non-intervention group attitude scale scores across the duration of the study. The pretest (Baseline, Time 1) results were once again used as the co-variate in order to control for differences that might exist prior to the intervention stage. At each of the data collection points a significant difference between intervention and non-intervention groups occurred, which confirms the previous analyses conducted with the smaller but stable longitudinal group. Table 9.5 presents a comparison of intervention and non-intervention group attitude differences.

Table 9.5 Comparison of Intervention and Non-Intervention Group Attitudes to Drug Use Controlling for Pre-Test Differences (ANCOVA) for the Cross-Sectional Sample

Grade and Data Collection Stage	Mean Square	df	F	p
Grade 6 - Post-test (N=602) (Time 1)	16350.26	1	230.4	.000
Grade 7 (Time 3)	5039.42	1	30.19	.000
Grade 8 (Time 4)	4572.19	1	26.42	.000
Grade 9 (Time 5)	3271.23	1	15.05	.000
Grade 10 (Time 6)	4174.05	1	20.74	.000

9.6 Conclusions

The results of both the cross-sectional and longitudinal analyses support hypothesis 1. Significant differences exist between intervention and non-intervention group attitudes to drug use and social and peer pressure to use drugs. As these differences are not present at the pretest, these results strongly suggest that the educational intervention program has not only had a significant immediate (post test) impact on intervention group attitudes, but that these changes are durable across a considerable length of time.

The links between attitudes and behavior in various drug use settings over time are not always clear. Many drug education programs claim that a succesful outcome has been achieved if knowledge or attitudes have changed. It is essential, however, that program evaluation occurs with regard to actual drug taking behaviour. The next chapter examines the differences in alcohol use between intervention and non-intervention group subjects.

Chapter Ten: Alcohol Use: An Evaluation of Group Differences

Hypothesis Two states that program participants (intervention group) should, in comparison to a no treatment group (non-intervention), show drug use behaviour that will reflect a more moderate, limited or minimal level of drug use in terms of:

(a) reduced incidence of drug use for commonly used drugs (eg., alcohol, tobacco, analgesics and marijuana);
(b) reduced frequency of drug use;
(c) reduced levels of usage for the most commonly used drugs; and
(d) reduced levels of self reported effects caused by alcohol consumption.

This chapter examines the difference between the intervention and non-intervention group's use of alcohol from Grade 6 until the final data collection stage at the end of Grade 10 in High School. In order to fully examine Hypothesis Two, successive chapters will further examine drug taking behaviour for tobacco, analgesics, marijuana, sedatives, hallucinogenics and opiates.

10.1 Statistical Treatment of the Data

Data obtained from the complete longitudinal subset and the larger but changing cross-sectional group were analysed in a number of ways in order to build up as complete a picture as possible of alcohol consumption differences between intervention and non-intervention group subjects. Descriptive statistics for both data sets have been included; but only the longitudinal subset frequencies are presented in this chapter. Frequency data obtained from the larger group are included in Appendix 3. Because the longitudinal group

provides a consistent reference point across time this group is generally examined first. Subsequent analysis of the cross-sectional data is then conducted in order to test the general applicability of the findings to a larger and more representative population.

The employment of a combined alcohol use scale incorporating all alcohol use questions was originally considered in order to reduce the number of analyses. Important aspects regarding the nature of consumption, and its effects, are lost when a composite scale is employed. In addition, plots of expected normal values and homogeneity of variance indicated that assumptions of normality were not adequately met when alcohol use items were combined. When items were analysed separately assumptions of normality were met and therefore the following three categories of alcohol use were examined:

1. the number of days alcohol was consumed last month,
2. the amount of alcohol usually consumed, and
3. the effects of drinking alcohol (levels of intoxication).

An analysis of covariance (ANCOVA) was conducted with the longitudinal sample with alcohol use at the pretest level (Time 1) as the covariate. The same form of analysis was also used with the larger cross-sectional group; but because membership of the group was not constant across all data collection points each grade was examined separately. The results of the cross-sectional analyses are presented later in the chapter.

The self report questionnaire contained a number of questions which simply required a yes or no answer. These dichotomous variables were analysed using logistic regression from the GLIM System Release 3.77 (Payne, 1986). The regression examined the

effects of gender differences, socio-economic status, involvement in sports and hobbies and intervention or non-intervention group status on use or non use of a range of drugs. The role of these variables will be reported more fully in Chapter 13, however, where sex differences appear to be significant this will be reported in context with the particular drug use behaviour being examined. In addition, all alcohol use questions are examined in terms of frequency distributions in order to provide an analysis of data at a descriptive level.

10.2 An Analysis of Intervention and Non-Intervention Group Use of Alcohol (longitudinal sample)

Hypothesis 2a states that there will be a reduced incidence of alcohol use between both groups. No significance differences between intervention and non-intervention group subjects were found for ever having used alcohol during all primary and high school grades. At all grade levels group differences with regard to use or non use of alcohol are hardly noticeable and they generally remain within two or three percentage points of each other (Table 10.1). Logistic regression was used to examine the relationship between use of alcohol and intervention or non-intervention group status, gender, and socio-economic status. At all data collection stages no significant differences were found, and therefore Hypothesis 2a, at least with regard to alcohol, was not supported. Subsequent questions regarding the incidence, or frequency of alcohol consumption as well as the amount consumed and subsequent levels of intoxication, would be expected, however, to more clearly demonstrate whether the program was successful or unsuccessful.

Table 10.1 Percentage of Subjects for Both Group and all Grade Levels in the Longitudinal Sample who Have Ever Drunk Alcohol

Group	Grade Level	Ever Drank Alcohol	
		Used Alcohol	Never Used Alcohol
Intervention Group Responses (N=150)	6	66.7	33.3
	7	80.0	20.0
	8	90.0	10.0
	9	93.3	6.7
	10	96.0	4.0
Non Intervention Group Responses (N=89)	6	64.0	36.0
	7	84.3	15.7
	8	92.1	7.9
	9	94.4	5.6
	10	96.6	3.4
Combined Set of Responses (N=239)	6	65.7	34.3
	7	81.6	18.4
	8	90.8	9.2
	9	93.7	6.3
	10	96.2	3.8

10.3 A Comparison of the Way Both Groups Used Alcohol (Hypotheses 2b, 2c, and 2d)

Subjects were asked to report both weekly and monthly use of alcohol in terms of days in which alcohol was consumed. Weekly use of alcohol may be a more arbitrary measure of alcohol use with younger children (eg., Grades 6 and 7) because children at this age infrequently use alcohol. Less than 6% of Grade 6 children report drinking alcohol during the past month. If the monthly use percentages are broken down to provide a weekly analysis at Grade 6 it might be expected that only 1 to 2% of children might drink alcohol at this age. It is also possible that an examination of weekly alcohol use reports could produce misleading findings if children who rarely consume alcohol report drinking during the week of the survey (or vice versa). Differences in weekly usage patterns at the pretest stage were not examined statistically in this chapter, although frequency distributions are provided in Table 10.2.

Table 10.2 Levels of Weekly and Monthly Use of Alcohol for Both Groups and All Grade Levels

Group	Grade Level	Days Used Alcohol During the Last Month (Percent)							Number of Days Consumed Alcohol During Last Week (Percent)				
		Nil	1-2	3-5	6-9	10-19	20+	Every day	Nil	1-2	3-4	5-6	Every day
Intervention Group Responses (N=150)	6	94.1	6.0	-	-	-	-	-					
	7	81.3	17.3	1.3	-	-	-	-	96.0	4.0	-	-	-
	8	62.7	30.7	6.0	.7	-	-	-	82.0	17.3	.7	-	-
	9	50.0	32.0	12.0	4.0	.7	1.3	-	75.3	22.0	2.0	.7	-
	10	40.7	40.0	12.7	4.0	2.0	.7	-	70.9	24.0	3.3	.7	1.3
Non Intervention Group Responses (N=89)	6	94.3	5.7	-	-	-	-	-					
	7	55.1	39.3	3.4	2.2	-	-	-	80.9	16.9	1.1	1.1	-
	8	44.9	38.2	15.7	1.1	-	-	-	75.3	23.6	1.1	-	-
	9	40.4	38.2	11.2	7.9	2.2	-	-	70.8	25.8	3.4	-	-
	10	37.1	34.8	19.1	6.7	2.2	-	-	56.6	42.7	5.6	1.1	-
Combined Set of Responses (N=239)	6	94.1	5.9	-	-	-	-						
	7	71.5	25.5	2.1	.8	-	-	-	90.4	8.8	.4	.4	-
	8	56.1	33.5	9.6	.4	.4	-	-	79.5	19.7	.8	-	-
	9	46.4	34.3	11.7	5.4	1.3	.8	-	73.6	23.4	2.5	.4	-
	10	39.3	38.1	15.1	5.0	1.3	1.3	-	63.2	31.0	4.2	.8	.8

A profile analysis was conducted in order to examine differences between intervention and non-intervention groups at all data collection stages with regard to the number of days alcohol was consumed during the last month. Significant main effects were recorded with regard to group (intervention or non-intervention) across all program grades for the monthly use of alcohol $F(1,232)=10.06$, $p<.01$. This pattern was repeated in comparisons between intervention and non-intervention group differences regarding the amount of alcohol consumed $F(1,228)=10.61$, $p<.002$ and for self reported effects from alcohol consumption $F(1,233)=11.31$ $p<.001$. At the Grade 6 level children were barely drinking and, in consequence, comparisons of intoxication and amount of alcohol drunk could not be made. It is clear, both from the frequency tables and from the statistical analyses conducted, that program participants, in comparison to the non-intervention group, report significantly lower levels of alcohol use. Intervention group subjects appear to consume less alcohol, drink less frequently and also report lower levels of intoxication.

Differences between intervention and non-intervention group subjects are most noticeable with regard to moderate or heavy levels of alcohol consumption (Table 10.3) and subsequently derived effects (Table 10.4). Intervention group subjects certainly choose to drink alcohol, but they appear to not progress to the stage where they become intoxicated. Considerable differences between groups existed once drinking behaviour had become fairly well established in the later school grades. For example, 11% and 17% of intervention group subjects in Grades 9 and 10 respectively indicate levels of intoxication ranging from a fair bit drunk to passed out. Non-intervention group

Table 10.3 Amount of Alcohol Typically Drunk for Both Groups in the Longitudinal Sample at each Grade Level

Group	Grade Level	Usual Amount of Alcohol Drunk						
		Nil	Few Sips	1-2 drinks	3-4 drinks	5-8 drinks	9-12 drinks	12+ drinks
Intervention	7	26.7	60.0	12.0	.7	.7	-	-
Group	8	19.4	44.0	26.7	6.7	2.0	.7	.7
Responses	9	11.4	38.0	30.0	9.3	6.0	2.0	3.3
(N=150)	10	16.6	20.7	32.7	11.3	10.0	4.0	4.7
Non-Intervention	7	18.0	49.4	25.8	5.6	1.1	-	-
Group	8	18.0	28.1	38.2	7.9	5.6	1.1	1.1
Responses	9	16.9	23.6	28.1	9.0	11.2	5.6	5.6
(N=89)	10	10.1	12.4	27.0	14.6	19.1	5.6	11.2
Combined	7	23.1	56.3	17.2	2.5	.4	-	.4
Set of	8	18.5	38.2	31.1	7.1	3.4	.8	.8
Responses	9	13.0	32.8	29.4	4.2	8.0	3.4	4.2
(N=239)	10	13.5	17.7	30.8	12.7	13.5	4.6	7.2

Table 10.4 Self Reported Effects of Alcohol Consumed for Both Groups in the Longitudinal Sample at each Grade Level

Group	Grade Level	Effects from Drinking Alcohol					
		Nil - no Effects	Hardly Any	Tipsy	Fair Bit Drunk	Very Drunk	Passed Out
Intervention	7	88.7	9.3	2.0	-	-	-
Group	8	74.5	16.0	6.0	1.3	1.3	1.3
Responses	9	65.3	15.3	8.7	6.7	4.0	-
(N=150)	10	59.3	14.7	8.7	10.7	5.3	1.3
Non-Intervention	7	77.6	16.9	3.4	1.1	1.1	-
Group	8	61.8	18.0	12.4	2.2	4.5	1.1
Responses	9	55.1	15.7	13.5	7.9	5.6	2.2
(N=89)	10	40.5	12.4	15.7	19.1	9.0	3.4
Combined	7	84.4	12.2	2.5	.4	.4	-
Set of	8	69.4	16.8	8.4	1.7	2.5	1.3
Responses	9	61.2	15.6	10.5	7.2	4.6	.8
(N=239)	10	51.9	13.9	11.4	13.9	6.8	2.1

subjects indicated much higher levels of intoxication with almost 16% of Grade 9 students and 31% of Grade 10 students falling into the same categories. The same pattern is found for amounts of alcohol typically drunk by Grade 9 and Grade 10 subjects, where 11% and 19% of intervention group subjects consumed between five and twelve or more alcoholic drinks, respectively, as compared to 21% and 36% of non-intervention group subjects in Grades 9 and 10.

A comparison of alcohol use with regard to both frequency of use, consumption and levels of intoxication indicated that the groups behave differently. Intervention group subjects do not appear to commence drinking regularly as early as non-intervention group subjects. The early differences regarding use or non use of alcohol do fade by Grades 9 and 10 but at no stage do intervention group subjects drink to the same levels as their non-intervention group counterparts.

10.4 Further Analyses of Intervention and Non-Intervention Group Use of Alcohol Conducted With the Cross-Sectional Data Sample

The longitudinal data, analysed previously, is part of the larger cross-sectional data set, and results from both groups would be expected to be very similar. Results of analyses conducted with the cross-sectional sample are included in Appendix 3. A brief summary of the findings, and the degree of concordance between the longitiudinal and cross-sectional results, are provided in this section.

No significant differences were apparent with regard to intervention and non-intervention group incidence of alcohol use. A comparison of the intervention and non-intervention groups' choice to

either use or not use alcohol was analysed by logistic regression and the results were identical to those found with the longitudinal sample. No significant differences were found. A complete table of logistic regression analyses examining all dichotomous variables, such as use or non use of alcohol, is provided in Chapter 13.

The overall pattern of results for all alcohol use categories was essentially the same for both the longitudinal and cross-sectional samples. Subjects in the intervention group drank significantly less alcohol,they drank less frequently and reported lower levels of alcohol use effects following alcohol consumption. The same approach to analysis, used earlier, with the longitudinal subset was employed with the larger cross-sectional data set, but separate grade by grade comparisons were performed as the changing nature of the cross-sectional group did not permit an overall time series analysis.

At Grade 6 intervention and non-intervention groups did not significantly differ ($t(604)=-0.20, p=.84$) with regard to monthly use of alcohol. Monthly alcohol use at the Grade 6 pretest was employed as a covariate and separate grade by grade analyses were performed on each of the three alcohol use variables examined in the longitudinal analyses (monthly use, amount consumed and subsequent levels of intoxication). The Analysis of Covariance (ANCOVA) reported in Table 10.5 presents a fairly consistent picture across all three categories of drug use behaviour and across almost all grades. In Grades 7 and 8 the drinking behaviour of intervention group subjects is significantly less than that of their non-intervention group counterparts for all three alcohol use categories examined.

Table 10.5 A Comparison of Intervention and Non Intervention Group Alcohol Use at Each Time Interval (ANCOVA) for the Cross Sectional Sample

	Number of Days Drank Last Month			Amount of Alcohol Typically Consumed			Effects of Alcohol Use Levels of Intoxication		
	F	p	df	F	p	df	F	p	df
Grade 7	38.36	.000	1,415	18.12	.001	1,414	10.83	.001	1,412
Grade 8	8.97	.003	1,405	12.75	.000	1,405	10.12	.002	1,405
Grade 9	1.57	.211	1,493	2.85	.092	1,490	3.94	.048	1,488
Grade 10	5.38	.021	1,427	15.59	.000	1,425	6.84	.009	1,424

Note: At the pretest in Grade 6 there were no significant differences between groups for monthly use of alcohol (t =-.02, p=.84) and for the incidence of alcohol use.

At Grade 9, however, group differences between two of the drug use categories (monthly frequency and amount of alcohol consumed) are not significant. Self reported intoxication levels still continue to be significantly different at this grade (p=<.05); and although the amount of alcohol consumed fails to reach the .05 level of significance, a clear trend towards lowered consumption by the intervention group is discernible (F(1,490)=2.85, p=.092). At the Grade 10 level the treatment effect appears to be re-established, as all three categories of drug use again show significant differences between intervention and non-intervention group alcohol use behaviour.

The overall conclusion with regard to a comparison between cross-sectional analyses and analyses performed with the longitudinal sample is that the results are almost identical. The analyses reported for the longitudinal sample and for the cross-sectional sample indicate that with the exception of incidence figures for alcohol significant differences existed between intervention and non-intervention groups.

The fact that incidence of use differences are not found is hardly surprising as almost all young people, at some stage in their high school career, might be expected to take at least one sip of alcohol. Hypothesis 2a is therefore not supported.

Hypotheses 2b, 2c and 2d examined levels of alcohol consumption and subsequently derived intoxication. The analyses reported for both the longitudinal and cross-sectional samples indicate that the intervention group uses alcohol less frequently, in lesser amounts and reports considerably lower levels of subsequent effects. Even though at Grade 9 the cross-sectional analysis suggests that program effects appear to fade, they are re-established by Grade 10. Hypotheses 2b, 2c and 2d are supported, as significant alcohol use differences are present between groups.

10.5 A Comparison Between a Parametric and Nonparametric Analysis of Drug Use Data.

Before moving onto the next set of analyses, examining the effects of intervention on the use of other drugs, the results of a set of additional analyses with the major alcohol use variables will be examined. This re-examination of alcohol use occurs because a corresponding but nonparametric method of analysis has been applied to group differences for the use of tobacco, analgesics and marijuana. Each of these three remaining drug use categories were originally analysed using a parametric approach during the preliminary stages of exploratory data analysis. After an examination of plots of expected normal values and homogeneity of variance, tobacco, analgesics and marijuana failed to meet the assumptions for normality. Basic assumptions were violated thus invalidating the employment of a

parametric approach. Rather than ignoring these findings and invalidly using an analysis of variance model, a different form of analysis has been applied to the remaining drugs to be analyses.

10.6 The Application of A Rate of Change Analysis to Intervention and Non-Intervention Group Drug Use

The first step taken in analysing the nature of drug use for the less commonly used substances involved a comparison of intervention and non-intervention group rate of change behaviour. Rate of change analysis examines the change in behaviour relative to Grade 6 measured across all later grades. As children mature the normal expectation, regarding drug use, is that there will be a steady increase over time. The analysis of rates of change permits a comparison of the degree to which intervention and non-intervention group drug use increases overtime. The rate of change analyses were calculated using the formula below which compares drug use relative to the baseline at the Grade 6 pretest with later self reported drug use levels at Grades 7, 8, 9 and 10.

Rate of Change Formulae

Grade 7 behaviour minus Grade 6 behaviour = Grade 7 rate of change

(Grade 8 behaviour minus Grade 6 behaviour)/2 = Grade 8 rate of change

(Grade 9 behaviour minus Grade 6 behaviour)/3 = Grade 9 rate of change

(Grade 10 behaviour minus Grade 6 behaviour)/4 = Grade 10 rate of change

The average rate of change across all time periods since Grade 6:
((Gr7-Gr6)+((Gr8-Gr6)/2)+((Gr9-Gr6)/3)+((Gr10-Gr6)/4))/4

A Mann-Whitney U-Test was employed in order to examine the difference between intervention and non-intervention groups' Median rates of change relative to the baseline period at Grade 6 across the

later time periods (Grades 7, 8, 9, 10). In addition, an averaged effect across all time periods was calculated.

The rate of change analysis procedure could be considered as similar to analysis of covariance used for separate grade by grade comparisons. Each subject's initial drug use level is used as his or her own covariate for the dependent measure of drug use behaviour examined after the educational intervention. In this way, covariation on the dependent drug use variable prior to the intervention procedure is measured and controlled with each subject, rather than attempting to measure a class, or school and to then try and control or "equate" the groups. The rate of change method also uses the pretest measure in order to compare relative changes between each individual's own pretest drug use levels and subsequent post intervention drug use. This procedure, therefore, estimates the contribution of the intervention program on post treatment drug use behaviour in much the same way as the previous parametric approaches have.

Because the analyses to follow in Chapter 11, and beyond, employ only a nonparametric method, further analysis will be conducted on the alcohol use data using the rate of change method. This will permit a comparison to be made between the results from both methods. An additional set of analyses has also been undertaken with the longitudinal subset that permits the identification and plotting of the nature of the rate of change model for alcohol use.

10.8 The Nature of the Rate of Change Model for Drug Use

A comparison between intervention and non-intervention group rate of change provides data regarding the degree to which drug use alters for each group, but it does not provide information about the nature of the rate of change model. A method of selecting between four possible growth curves, each of which were polynomials of order 1, 2, 3, or 4 was employed in order to identify the nature of the rate of change model. The method employed a backward elimination approach which, at each stage, determined whether a polynomial of lower order was appropriate for fitting the growth of drug use behaviour. The analysis of growth curve models for all four major drug categories identified the best fitting model (a linear, quadratic, cubic or polynomial order 4 term) for both intervention and non-intervention groups. A Wilcoxon matched-pairs signed ranks test was used in order to determine the best fit. A mathematical formula and further description of the backward elimination method is provided in Appendix 3.

It was decided to plot growth curves examining the nature of drug use across the high school grades by selecting lower, median and upper quartiles within each drug use category. This provides an estimation of the way in which the intervention program has effected the average drug user (median use) minimal users (lower quartiles) and heavier users (upper quartiles). In addition these categories of measurement are less susceptible to distribution bias due to extreme outliers.

A regression analysis between grade levels and median, lower and upper quartile levels of drug usage (in this case, alcohol monthly

and amount of alcohol used) was conducted for all four major drug use categories in order to obtain the coordinates with which to plot the growth curves. The constant term obtained from the regression analysis of lower and upper quartiles and median levels of drug use was plotted for Grades 6 to 10 in relation to identified growth curve trends (eg., cubic, quadratic, or linear). The resulting graph permits comparison of the two groups and provides further information regarding the nature of group differences.

This type of analysis, therefore, reflects the impact of the drug education program on the majority of subjects, rather than on subjects whose behaviour is at very extreme levels of use. An examination of upper quartile scores for each group permits conclusions to be drawn about the impact of the program on the heavier users of drugs, but it cannot provide adequate information on individuals whose behaviour is at the very extreme levels of use. It would be unrealistic to expect one program to change drug use behaviour across all levels, and the psychosocial developmental influence model led to a program that was designed to influence the general population of teenagers rather than those who are at extreme levels of risk.

10.9 Rate of Change Analysis For Alcohol Use

The results of the mean rate of change analysis comparing monthly alcohol use by intervention and non-intervention group subjects in the longitudinal sample are presented in Table 10.6. At the baseline in Grade 6 there is no significant difference between groups ($z=-.01$ $p=.91$). One year later (Grade 7) a significant difference in the rate of change between groups occurs ($z=-4.65$, $p<.001$).

Significant rate of change differences also occur at the Grade 8 stage and for the averaged effect across all data collection points (z=-3.66,p<.001).

The previous parametric analysis of monthly alcohol use indicates complete concordance with the Mann-Whitney Rate of Change Analysis as the averaged effect across all grades and the analysis of covariance (ANCOVA) conducted across all grades both have similar significant levels (Mann-Whitney Rate of Change analysis across all grades was <.001; ANCOVA across all grades <.01). Although levels of significance change at each grade level and there is a reduced level of difference between intervention and non-intervention groups' monthly usage of alcohol in later grades, all z values reported in Table 10.6 are minus quantities, indicating that lower rates of change were recorded by the intervention group in comparison to the non-intervention group.

Table 10.6 Mean Rate of Change Analyses Examining the Monthly Frequency of Alcohol Use For Four High School Years Relative to Grade 6 (Baseline)

Grade Comparisons	Monthly Use of Alcohol for Longitudinal Sample(N=239)	
	Mann-Whitney U test z scores	Probability Levels (1 tailed)
Grade 6 (Time1-baseline)	-.0113	.91*
Grade 7-6	-4.65	.000
Grade 8-6	-2.95	.002
Grade 9-6	-1.56	.095
Grade 10-6	1.112	.13
Averaged effect across all data collection points	-3.66	.000

* The baseline comparison is a 2 tailed test

10.10 Agreement Between Results for Parametric and Nonparametric (Rate of Change) Analyses

A comparison of parametric and nonparametric analyses at each grade with regard to monthly alcohol use, amount of alcohol consumed, and self reported effects suggests that both approaches obtained essentially the same results. Table 10.7 presents the results for both forms of analyses. There is almost complete concordance between both sets of analyses. If an examination of the twelve Cross-Sectional Analyses and the three longitudinal analyses are set at the .05 level of significance, thirteen out of a possible fifteen analyses are the same. The conclusions reached after examination of both sets of analyses are the same: in comparison to the non-intervention group the intervention group shows significantly reduced frequencies and levels of alcohol use.

Table 10.7 Concordance of Probability Levels Between Parametric and Non Parametric Analyses of Alcohol Use for the Cross-Sectional Sample

Grade Level Analysis	Monthly Use of Alcohol Probability Levels		Amount of Alcohol Used Probability Levels		Typical Effects From Use of Alcohol Probability Levels	
	Mann-Whitney	ANCOVA	Mann-Whitney	ANCOVA	Mann-Whitney	ANCOVA
7	.000	.000	.000	.000	.001	.001
8	.003	.003	.001	.000	.003	.002
9	.011	.211	.051	.092	.022	.048
10	.03	.021	.000	.000	.095	.009

Note: Both a Mann-Whitney Rate of Change Analysis averaged across all grades and a Ancova analysis across all grades for the longitudinal sample were significant at <.001 level for all three variables examined.

10.11 The Nature of the Rate of Change Model for Alcohol Use

The final analyses conducted with regard to alcohol use by both intervention and non-intervention groups involved an examination of a rate of change model. Table 10.8 indicates that, for both groups, a predominantly linear trend is present. A clear linear model can be identified for monthly alcohol use, whereas the amount of alcohol consumed has both a quadratic and linear term. Figure 10.1 permits comparisons of the relative levels of alcohol use for both categories. In both graphs, median and upper quartile levels of use are lower for the intervention group. Lower quartile frequency of monthly alcohol use is zero, whilst median levels move upwards at about the same rate, although the non-intervention group median frequency of use is always above the intervention median. At the Grade 7 level the upper quartile of the non-intervention group is considerably above that of the intervention group, but by the end of Grade 10 the frequency rate of drinking for subjects in this upper quartile range is the same for both groups. There is considerable similarity in the monthly rate of increase for the groups; the non-intervention group frequencies are always higher, however.

A comparison of group differences with regard to the amount of alcohol consumed indicates that at median,lower and upper quartile levels, clear differences emerge (Figure 10.1(b)). Non-intervention group subjects drink more alcohol in each of the quartile ranges examined. That difference is considerable when the upper quartile rates are compared. The intervention group upper quartile is only at the same level as the the median range for the non-intervention group, whilst the upper quartile for the non-intervention group is considerably higher.

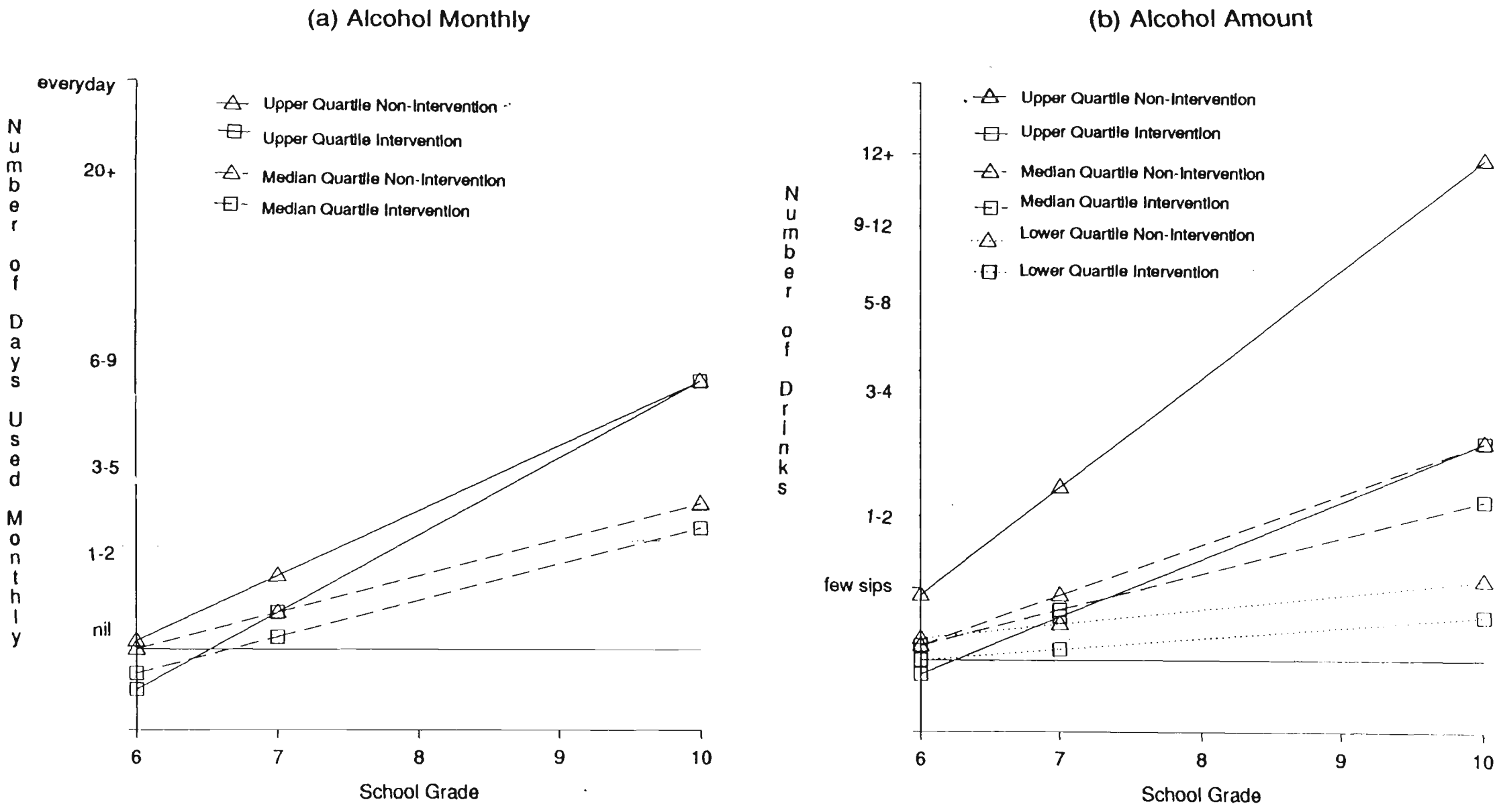
Table 10.8 Analysis of Growth Curve Models Over Four Years for Monthly Alcohol Use and Amount of Alcohol Consumed by Intervention and Non Intervention Group Subjects (Wilcoxon Matched-Pairs Signed Ranks Test)

Nature of Growth Curve		Alcohol Use Variable	
		Monthly Use of Alcohol (z scores)	Amount of Alcohol Used (z scores)
Polynomial of order four	Intervention	-0.52	-1.5
	Non-intervention	-0.37	-0.28
Polynomial of order three (cubic)	Intervention	-0.49	-1.86
	Non-intervention	-0.77	-1.51
Polynomial of order two (quadratic)	Intervention	-0.74	-4.30**
	Non-intervention	-1.72	-2.96
Polynomial of order one (linear)	Intervention	-8.57**	-8.71**
	Non-intervention	-6.76**	-7.60

**p<.01

In all parametric and nonparametric analyses, Hypotheses 2b, 2c and 2d are supported. There is no difference, between groups, with regard to the incidence levels for use or non use of alcohol. However the most important aspects of drinking behaviour, the frequency of drinking, amount of alcohol consumed and levels of self reported intoxication, are significantly lower for the intervention group.

At the conclusion of this chapter a bridge between the two forms of analysis has been built. The results from both types of analyses indicate that high levels of agreement between the methods exists. This is important to note, because the following chapters examine use of drugs such as tobacco and marijuana, which is less frequent and therefore requires the employment of a nonparametric method.



Note: Lower quartile line is Y=0 for both groups

Figure 10.1 (a.b) Comparisons of alcohol use (monthly and amount) for intervention and non-intervention group subjects.

Chapter Eleven: A Comparison of Intervention and Non-Intervention Group Use of Tobacco and Analgesics

This chapter examines the differences between the intervention and non intervention groups' use of tobacco and analgesics from Grade 6 until the end of Grade 10. The analyses contained in this chapter further explore Hypothesis 2 by comparing the incidence rates, frequency of drug use, and levels of usage reported for two of the most common drugs used in adolescence.

A comparison of pretest usage levels for both tobacco and analgesics is presented in Table 11.1. No significant differences for the incidence of use and monthly levels of usage for tobacco and analgesics emerged regarding intervention group status.

Table 11.1 A Comparison of Intervention and Non-Intervention Group Tobacco and Analgesics Use at Pretest (Longitudinal Sample, N=239)

Drug Use Category	Mann-Whitney* z value	Probability Level
Ever smoked tobacco	-0.06	.95
Last month's use of tobacco	-1.13	.26
Ever used analgesics	-0.07	.95
Last month's use of analgesics	-1.34	.19

* 2-tailed significance level

Table 11.2 provides a comparison of intervention and non-intervention group use or non-use of tobacco. In Grade 7, 20% more non-intervention subjects have tried smoking. This gap remains

Table 11.2 Percentage of Subjects for all Group and Grade Levels who have Ever Smoked Tobacco

Group	Grade	Ever Smoked Tobacco	
		Never Smoked	Smoked
Intervention group responses (N=150)	6	71	29
	7	64	36
	8	52	48
	9	43	57
	10	39	61
Non intervention group responses (N=89)	6	71	29
	7	44	56
	8	29	71
	9	25	75
	10	17	83
Combined set of responses (N=239)	6	70	30
	7	57	43
	8	43	57
	9	36	64
	10	31	69

Table 11.3 Logistic Regression Analyses Examining Use or Non Use (incidence) of Tobacco with Intervention and Non-Intervention Group Status (N=239)

	Longitudinal Subset	
	Constant [(a)]	Intervention Group
Grade 7	.09 (.22)	-.85 (.28)
Grade 8	.20 (.31)	-.97** (.46)
Grade 9	.56 (.33)	-.87** (.63)
Grade 10	1.44 (.29)	-1.17** (.33)

* p<.05 ** p<.01

(a) The constant is a measure of the complete longitudinal samples use of tobacco with the effects of predictor variables removed. Where significant differences are noted a minus sign indicates that the group being examined (intervention group) used significantly less than subjects who were not in the intervention group.

Note: No significant interaction effects were found for use of analgesics and these are not reported in table.

Table 11.4 Levels of Monthly and Weekly Tobacco Use for All Subjects at all Grade Levels

Group	Grade Level	Days Smoked Tobacco During the Last Month (Percent)							Days Smoked Tobacco During the Last Week (Percent)				
		Nil	1-2	3-5	6-9	10-19	20+	Every day	Nil	1-2	3-4	5-6	Every day
Intervention	6	94	3.3	2.7	-	-	-	-					
Group	7	89.3	4.0	2.0	1.3	2.0	.7	4.0	94.0	3.3	1.3	1.3	-
Responses	8	88.0	4.0	.7	2.7	-	.7	4.0	91.3	3.3	.7	.7	4.0
(N=150)	9	82.7	6.0	.7	-	1.3	2.7	6.7	87.3	2.0	2.7	.7	7.3
	10	79.3	6.0	3.3	.7	1.3	.7	8.7	84.7	5.3	.7	.7	8.7
Non-Intervention	6	89.9	6.7	3.4	-	-	-	-					
Group	7	66.3	13.5	5.6	3.4	5.6	2.2	3.4	78.7	11.2	1.1	5.6	3.4
Responses	8	61.8	9.0	7.9	1.1	5.6	3.4	11.2	71.9	10.1	3.4	2.2	12.4
(N=89)	9	64.0	7.9	2.2	2.2	5.6	4.5	13.4	71.9	6.7	2.2	3.4	15.7
	10	56.2	11.2	5.6	1.5	5.6	2.2	18.0	70.8	5.6	4.5	2.2	16.9
Combined	6	92.5	4.6	2.9	-	-	-	-					
Set of	7	80.8	7.5	3.3	2.1	3.3	1.3	1.7	88.3	6.3	1.3	2.9	1.3
Responses	8	78.2	5.9	3.3	2.1	2.1	1.7	6.7	84.1	5.9	1.7	1.3	7.1
(N=239)	9	75.7	6.7	1.3	.8	2.9	3.3	9.2	81.6	3.8	2.5	1.7	10.5
	10	70.7	7.9	4.2	.8	2.9	1.3	12.1	79.5	5.4	2.1	1.3	11.5

essentially the same throughout all later grades. Logistic Regression was employed to compare statistically the responses of intervention and non-intervention group subjects across all grades on the dichotomous variable of use or non use of tobacco. Analyses for all dichotomous variables are presented in Chapter 13, but a section of the relevant logistic regression analyses is presented in Table 11.3. At each of the high school data collection points (Grades 7-10) there were significant differences (<.01 level in Grades 8,9,10 and <.05 at Grade 7) between groups with regard to incidence rates for smoking tobacco. The same pattern of differences also emerged with regard to monthly and weekly frequencies of smoking (Table 11.4) and the amount of tobacco used at each of the grade levels (Table 11.5).

Table 11.5 Levels of Tobacco Use for all Subjects at all Grade Levels

Group	Grade	Number of Cigarettes Smoked						
		Nil	Few Puffs	1-5	10	15	20	20+
Intervention Group Responses (N=150)	6	74.0	22.7	2.0	1.3	-	-	-
	7	76.7	19.3	4.0	-	-	-	-
	8	68.7	19.3	4.0	-	-	-	-
	9	66.0	12.0	15.3	4.7	1.3	-	-
	10	64.0	14.0	16.0	4.0	1.3	-	0.7
Non-Intervention Group Responses (N=89)	6	74.1	20.2	3.4	2.2	-	-	-
	7	49.4	27.0	22.5	1.1	-	-	-
	8	39.3	28.1	27.0	5.6	-	-	-
	9	41.6	19.1	31.5	4.5	2.2	-	1.1
	10	39.3	15.7	34.8	7.9	-	1.1	1.1
Combined Set of Responses (N=239)	6	74.1	21.8	2.5	1.7	-	-	-
	7	66.5	22.2	10.9	0.4	-	-	-
	8	57.7	20.5	18.4	2.9	0.4	-	-
	9	56.9	14.6	21.3	4.6	1.7	-	0.8
	10	54.8	14.6	23.0	5.4	0.8	0.4	0.8

11.1 A Comparison of Intervention and Non-Intervention Group Rates of Change in Tobacco Use Measured at All High School Grades Relative to Grade Six

A comparison of intervention and non-intervention group rates of change relative to Grade 6 (pretest) are presented in Table 11.6. Because the rate of change analyses examine drug use across all grades from Grade 6 to Grade 10 monthly drug use was chosen as the most representative unit of analysis on which to assess change across such a wide age range (ages 11 through to 16 or 17 years). The averaged rate of change comparison between intervention and non-intervention groups for monthly tobacco use across all post intervention grades was significant ($z=-4.85$, $p<.001$). At each of the discrete grade levels differences are clearly discernible. Intervention group subjects smoke less frequently at all separate grade points ($p<.001$), than do non-intervention group subjects. The pattern of results is essentially the same when the amount of tobacco smoked each day is the variable being examined. At the baseline comparison point no significant differences can be seen between groups ($z=-0.06$, $p=.94$). At the next data collection point in Grade 7 rates of change differ significantly between groups ($z=-5.36$, $p.<.001$). The intervention group continues to smoke fewer cigarettes than their non-intervention group counterparts and across all grades the averaged rate of change, relative to Grade 6, is significantly different ($z=-4.41$, $p<.001$).

The analysis of growth curve models for monthly tobacco use, and the amount of tobacco used, is presented in Table 11.7. A Wilcoxon Matched Pairs Signed Ranks Test was used in order to select between four possible growth curves (linear, quadratic, cubic or polynomial order 4). This method is exactly the same as that used previously in Chapter 10 for the nonparametric re-analysis of alcohol use.

Table 11.6 Rate of Change in Tobacco and Analgesics Use Over 4 Years Relative to Grade 6 (Baseline) (Mann-Whitney U test, z scores, N=239)

	Tobacco Monthly	Tobacco Amount	Analgesic Monthly
Grade 6 *	-1.13 (0.26)	.06 (.94)	-1.55 (.12)
Grade 7-6	-3.50 (.000)	-5.36 (.000)	-3.32 (.001)
Grade 8-6	-4.54 (.000)	-4.65 (.000)	-1.32 (.95)
Grade 9-6	-3.19 (.001)	-3.78 (.000)	-1.75 (.04)
Grade 10-6	-3.28 (.001)	-3.67 (.000)	-1.02 (.15)
Average calculated across all grades	-4.78 (.000)	-4.41 (.000)	-2.49 (.07)

Note: Figures in parentheses are probabilities
* Grade 6 test is 2 tailed but all other grades are 1 tailed tests.

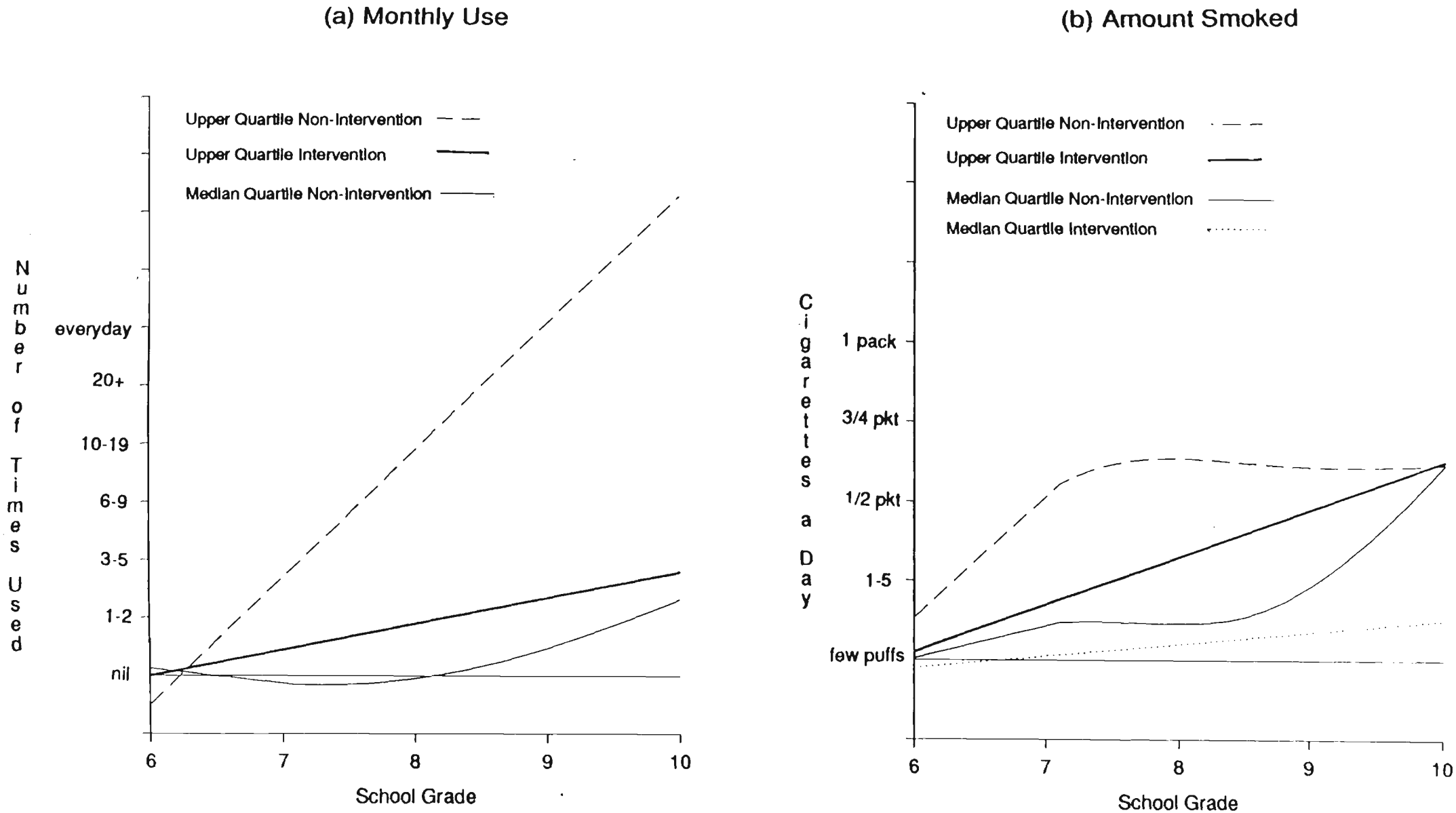
Table 11.7 Analysis of Growth Curve Models for Intervention and Non-intervention Group Use of Tobacco and Analgesics (Mann-Whitney U test, z scores)

	Tobacco Use Monthly		Tobacco Amount		Analgesics Use Monthly	
	Intervention	Non Intervention	Intervention	Non Intervention	Intervention	Non Intervention
Polynomial of order four	-0.04	-0.31	-0.95	-0.27	-0.83	-2.11*
Polynomial of order three (cubic)	-0.24	-0.85	-1.95	-3.89**	-3.32**	-1.98*
Polynomial of order two (quadratic)	-0.02	-2.16*	-1.29	-2.39**	-2.32*	-0.20
Polynomial of order one (linear)	-4.79**	-5.15**	-5.49*	-5.81**	-6.72**	-5.76*

* $p<.05$ ** $p<.01$

Analyses comparing growth curve rates of change were conducted separately for each of the two groups in order to determine the best fitting model. A linear trend was apparent for both monthly tobacco use and the amount of tobacco smoked. Although a linear trend dominates the analysis of both intervention and non-intervention group growth curve models, the non-intervention group growth curve for monthly tobacco use also contains significant quadratic features. In addition, the non-intervention group's growth curve for the amount of tobacco smoked displays quadratic, cubic and linear features. Both categories of tobacco use, for intervention and non-intervention group subjects, are graphed in Figure 11.1. Clear differences are apparent with regard to median, upper and lower quartile frequencies for monthly tobacco use. Lower quartile and median frequencies for the intervention group were not graphed, as usage was recorded at zero levels. Only the upper quartile for the intervention group was plotted, and these tobacco use levels for the heavier smokers in the intervention group are approximately the same as levels obtained for the median of the non-intervention group. Upper quartile frequency rates for the non-intervention group are considerably higher than the level of upper quartile tobacco use for the intervention group.

The picture with regard to the amount of tobacco smoked by each group is generally consistent with the previous analyses of monthly tobacco use. Both non-intervention group and intervention group lower quartiles are at zero. Median rates of usage remain fairly similar between groups until Grade 9, although at every level the median rates of usage for intervention group subjects are lower than that of their non-intervention group counterparts. Between Grade 9 and Grade 10, however, a considerable escalation in median levels of tobacco use



Lower quartile experimental and lower quartile control lines are not graphed. Y=0

Lower quartile experimental, medium quartile experimental and lower quartile control lines are not graphed, Y=0

Figure 11.1 (a.b) A comparison of monthly tobacco use and amount of tobacco used by intervention and non-intervention group subjects.

occurs for the non-intervention group. By the end of Grade 10 non-intervention median levels are directly comparable to those of the upper quartile levels for the intervention group. The upper quartile non-intervention group levels of tobacco use are considerably higher during the early high school years (7,8,9) than those of the intervention group, but by Grade 10 the intervention group has caught up to their non-intervention group peers.

During the early grades at high school, intervention group subjects, who have started to smoke, increase their smoking levels more slowly than non-intervention smokers. The gap between intervention and non-intervention group subjects remains for the majority of subjects in the lower quartile and median groups. By Grade 10 however, intervention group subjects in the upper quartile adopt similar smoking patterns to that of their non-intervention group smoking peers. They either choose to ignore, or forget the anti-smoking message contained in the intervention program. Although it could be argued that the impact of the intervention program appears to fade with time, it only fades with the upper quartile intervention smokers, and not with the majority of program participants.

11.2 A Comparison of Intervention and Non-Intervention Use of Tobacco Conducted with the Cross-Sectional Sample

Analysis of the complete data set at discrete grade levels support the findings that have already been reported for the longitudinal subset. At the pretest in Grade 6 no significant differences existed between intervention and non-intervention group use of tobacco (Table 1, Appendix 4). After intervention differences emerge regarding the levels of recruitment to tobacco use. Analyses examining use or non use of tobacco indicate that intervention group subjects begin using tobacco at

significantly lower rates than do non-intervention group subjects (Table 2, Appendix 4).

Grade by grade comparisons of monthly and weekly levels of tobacco use for each group at each discrete grade level are included in Appendix 4 (Table 3). The results can be summarized, however, by stating that non-intervention group subjects progress more rapidly into tobacco use than their intervention group counterparts. They smoke tobacco more frequently and also appear to smoke more cigarettes.

Table 11.8 Grade by Grade Comparisons of Tobacco Use Behaviour for Intervention and Non-Intervention Group Subjects (Cross-Sectional Sample)

Grade Level	Number of Days Tobacco Smoked Last Month		Number of Days Tobacco Smoked Last Week		Amount of Tobacco Smoked	
	z	p	z	p	z	p
Grade 6 (N=605)	-1.42	.14*	-	-	-0.39	.69*
Grade 7 (N=419)	-5.55	.000	-4.92	.000	-5.69	.000
Grade 8 (N=413)	-5.69	.000	-4.80	.000	-5.29	.000
Grade 9 (N=500)	-2.23	.01	-2.05	.02	-3.29	.001
Grade 10 (N=436)	-2.34	.01	-1.42	.08	-2.10	.02

* Note: The significance quoted is for a Mann-Whitney U-test 2-tailed test. All other p values are 1 tailed.

Rate of change analyses conducted with the larger cross-sectional sample at each grade level (Table 11.8) support the results previously reported for the longitudinal sample. Intervention and non-intervention group differences emerge after the Grade 6 data collection stage with all

categories of tobacco use examined (monthly use, weekly use and amount smoked) showing significant differences between groups. A comparison of weekly tobacco use behaviour is essentially similar to that obtained for monthly frequency (Table 3, Appendix 4). Significant differences between intervention and non-intervention group subjects exist at all grade levels with regard to the amount of tobacco actually smoked. Once again there is evidence of the fading strength of the program as probabilities decrease, but at no time do they fail to reach significance at a .05 criteria level except for Grade 10 weekly smoking levels.

The overall conclusion regarding the differences between intervention and non-intervention group tobacco use for both the longitudinal sample analyses and for the larger cross-sectional analyses is that Hypotheses 2a, 2b, 2c and 2d are all supported. The findings for both longitudinal and cross-sectional groups are consistent. Intervention group subjects, in comparison to non-intervention group subjects, are less likely to begin using tobacco. They smoke tobacco less frequently, and appear to smoke fewer cigarettes.

11.3 A Comparison of Intervention and Non-Intervention Group Use of Analgesics

A comparison of intervention and non-intervention group use of analgesics at pretest indicated that no significant differences existed (Table 11.9). After intervention no significant differences between groups was found. This is hardly surprising as saturation point has already been established at the baseline stage in Grade 6 when 95.4% of the longitudinal subset have already used analgesics. Throughout all data collection stages following intervention both groups continue to use analgesics, but in general they remain within two to three percentage

points of each other, and by Grade 10 97.9% of the total sample has indicated use of analgesics. Hypothesis 2a, which suggests that differences will be found between intervention and non-intervention group use or non use of certain drugs, is not supported with regard to the use of analgesics.

Table 11.9 Percentage of Subjects in All Groups and Grade Levels Who Have Ever Used Painkillers (Analgesics)

Longitudinal Sample	Grade	Painkiller Use	
		Used Painkillers	Never Used Painkillers
Intervention Group Responses (N=150)	6	94.0	6.0
	7	95.3	4.7
	8	95.3	4.7
	9	96.0	4.0
	10	98.7	1.3
Non-Intervention Group Responses (N=89)	6	97.8	2.2
	7	100.0	0.0
	8	97.8	2.2
	9	98.9	1.1
	10	96.6	3.4
Combined Set of Responses (N=239)	6	95.4	4.6
	7	97.1	2.9
	8	96.2	3.8
	9	97.1	2.9
	10	97.9	2.1

11.4 A Comparison of Intervention and Non-Intervention Group Rate of Change for the Use of Analgesics at all High School Grades Relative to Grade 6

At the pre-test measurement point there was no significant difference between monthly use of analgesics ($z=-1.34$, $p=.191$). In fact, at this stage, intervention group subjects reported slightly higher rates of usage with 35% of respondents indicating they have used analgesics in Grade 6 as compared to approximately 25% of non-intervention group subjects. At the post intervention stage in Grade 7 there is a fairly

strong reversal of this finding, with 66% of intervention group subjects indicating no use during the previous month, as compared to approximately 49% of non-intervention group subjects, who did not use analgesics (Table 11.10). This finding is also supported by the rate of change analysis for the longitudinal sample between Grades 6 and 7 where z=-3.32,p<01. After Grade 7 the differences in monthly analgesic use begin to fade. At the Grade 8 and 10 rate of change comparison points, no significant differences emerge, whereas at Grade 9 there are differences at the .05 level of significance. The averaged rate of change, calculated across all time intervals from Grade 7 to Grade 10 (Table 11.6), does indicate,however, that there are significant differences between groups in the predicted direction. A comparison of the number of pain killing tablets used in the past week by intervention and non-intervention group subjects (Table 11.10) suggests that there are differences in Grade 7 but at Grades 8 through to 10 these differences have generally disappeared. It needs to be noted, however, that where there are differences, it is the intervention group who are generally lower in levels of overall use of analgesics.

The analysis of the growth curve was only performed on the monthly use of analgesics as no significant differences had emerged with regard to the other aspects of analgesic use. The growth curves for both intervention and non-intervention groups do not differ greatly and both contain linear, quadratic and cubic terms.The non-intervention group curve is additionally complicated with the inclusion of a polynomial of order four. The intervention group growth curve (Figure 11.2) is lower at both the bottom quartile and median levels, generally indicating that at the level of minimal or moderate usage group differences do exist. The upper quartile growth curve is identical for both intervention and non-

Table 11.10 Monthly Frequency of Analgesic Use and Number of Tablets Taken Last Week for all Subjects at all Grade Levels

Group	Grade Level	Days Used Analgesics During the Past Month (Percent)							Number of Analgesics Taken During Past Week (Percent)					
		Nil	1-2	3-5	6-9	10-19	20-30	Every day	Nil	1-2	3-6	7-13	14-27	28 or more
Intervention	6	64.7	28.0	5.3	2.0	-	-	-						
Group	7	66.2	28.2	5.6	-	-	-	-	92.2	6.4	1.4	-	-	-
Responses	8	50.3	37.1	6.3	2.8	1.4	2.1	-	75.5	18.9	3.5	1.4	.7	-
(N=150)	9	36.6	44.1	13.1	4.1	.7	.7	.7	67.4	22.9	6.9	2.8	-	-
	10	29.3	41.5	19.7	6.8	1.4	1.4	-	59.6	26.0	9.6	2.7	.7	1.4
Non Intervention	6	74.2	21.3	3.4	1.1	-	-	-						
Group	7	48.9	39.8	9.1	1.1	1.1	-	-	81.2	17.6	1.2	-	-	-
Responses	8	48.3	40.2	9.2	2.3	-	-	-	77.0	17.2	3.4	2.3	-	-
(N=89)	9	33.0	45.5	11.4	5.7	2.3	1.1	1.1	67.0	18.2	5.7	4.5	3.4	1.1
	10	25.3	46.0	20.7	3.4	-	1.1	3.4	54.5	27.3	11.4	4.5	-	2.3
Combined	6	68.2	25.5	4.6	1.7	-	-	-						
Set of	7	59.6	32.6	7.0	.4	.4	-	-	88.1	10.6	1.3	-	-	-
Responses	8	49.6	38.3	7.4	2.6	.9	1.3	-	76.1	18.3	3.5	1.7	.4	-
(N=239)	9	35.2	44.6	12.4	4.7	1.3	.9	.9	67.4	21.2	6.5	3.4	1.3	.4
	10	27.8	43.2	20.1	5.6	.9	1.3	1.3	57.7	26.5	10.3	3.4	.4	1.7

intervention group users and indicates a very strong upwards trend between Grades 9 and 10. It would appear that the heavier users of analgesics within the intervention group would appear to reject the intervention message and conform very quickly to the behaviour of their peers and this is similar to the behaviour of upper quartile smokers.

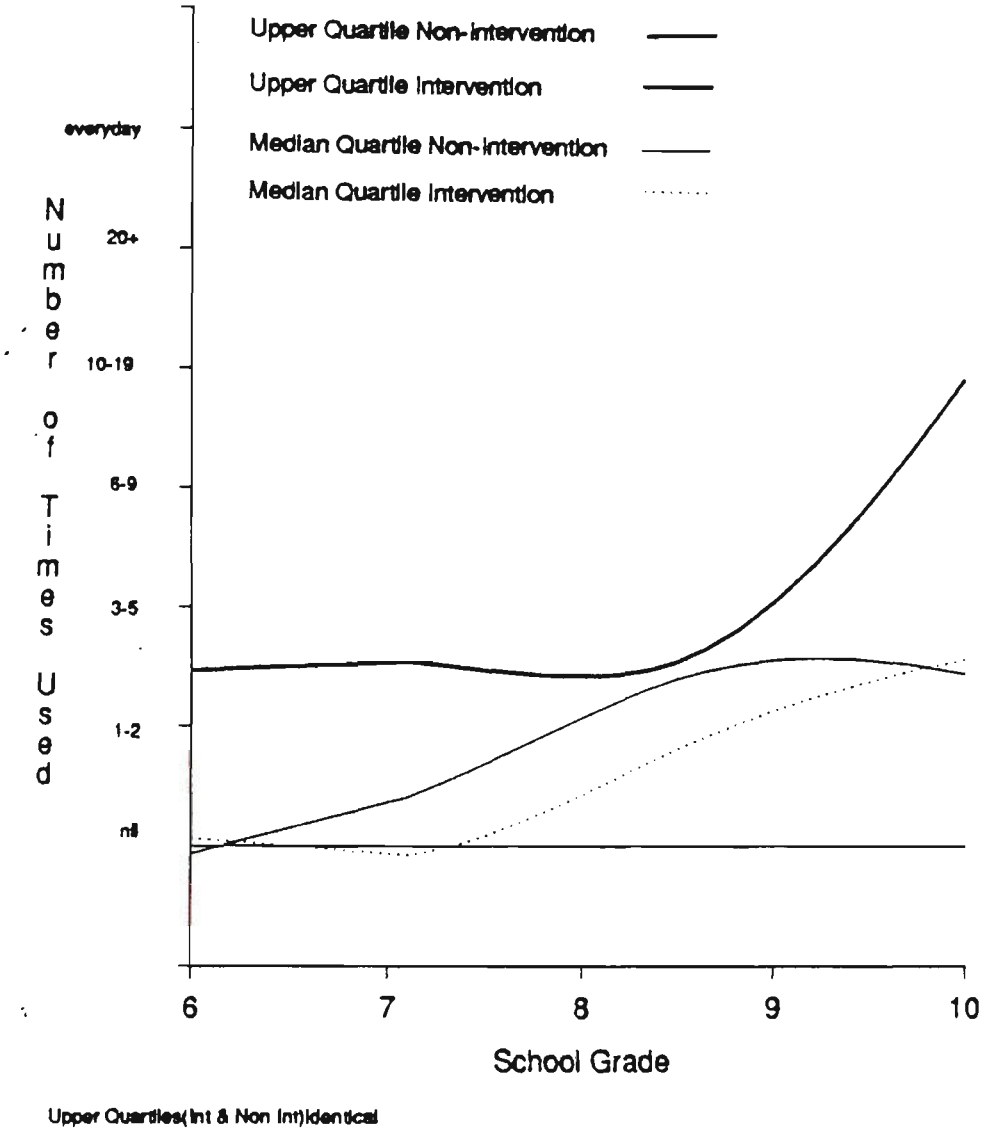


Figure 11.2 A comparison of monthly analgesics use for intervention and non-intervention groups.

11.5 Analyses of Intervention and Non-Intervention Group Differences in Analgesic Use (Cross-Sectional Sample)

The results obtained from the analysis of the larger cross-sectional sample generally support the findings of the smaller longitudinal subset. At the pretest no significant differences, regarding the incidence of

analgesic use emerged (z=0.77, p=.44). There were no significant differences regarding incidence of use throughout the duration of the study (see Table 2, Appendix 4). Monthly analgesic use did show significant changes however following the intervention phase. At the pretest, results did not differ significantly between groups (z=.89, p=.37), but by Grade 7 intervention group subjects reported significantly lower monthly frequencies of use (z=-3.41, p<.001). These changes were short lived however, and as Table 11.11 records, differences between groups failed to reach significance for the remainder of the data collection stages. This pattern appears to be repeated with regard to the number of tablets taken during the previous week. In Grade 7 quite significant differences exist (z=-2.96, p=<.001), but by Grade 8 until Grade 10 the number of tablets taken by members of each group is not significantly different. Frequency tables examining analgesics use are included for reference in Appendix 4.

Table 11.11 Grade by Grade Comparisons of Analgesic Use Behaviour for Intervention and Non-Intervention Group Subjects (Cross-Sectional Sample, N=619)

Grade Level	Number of Days Analgesics Used Last Month		Number of Tablets Taken Last Week	
	z	p	z	p
Grade 6 (N=610)	0.89	.37*	-	-
Grade 7 (N=419)	-3.41	.000	-2.96	.003
Grade 8 (N=413)	-0.23	.82	-0.50	.61
Grade 9 (N=500)	-.41	.68	-1.38	.17
Grade 10	-0.61	.54	-0.29	.78

* Note: The significance level quoted is for a Mann-Whitney 2-tailed test. All other p values are 1 tailed.

11.6 Summary of Findings and Conclusions Regarding Analgesic Use

Hypothesis 2a is not supported as no significant differences in incidence of analgesic use are found between intervention and non-intervention groups. This finding is hardly surprising as saturation point in terms of ever having used analgesics had occurred at the pretest stage prior to the implementation of the drug education program. There are slight variations regarding the pattern of significant results between the analysis of the longitudinal sample and the larger cross-sectional sample. The cross-sectional results indicate that significant differences only occur at the Grade 7 level between intervention and non-intervention group monthly use of analgesics, whereas significant differences are recorded at both the Grade 7 and Grade 9 rate of change points of comparison for the longitudinal group.

These findings, when viewed across the time span of all four years, do not, however, adequately support the belief that significant differences exist between groups with regard to the monthly use of analgesics. At Grade 7 there are significant differences between groups with regard to the number of analgesics taken during the last week. These differences have faded by Grade 8 and they do not re-emerge.

Although it is possible to argue that a significant intervention effect has occurred in Grade 7, Hypotheses 2b and 2c must also be rejected in view of the overall pattern of non-significant results recorded across all other grades. It appears that behaviour changes, with regard to the use of pharmaceuticals, which are widely accepted and regarded as essential to normal coping and symptomatic relief of minor ailments, may only be manipulated in the short term. Because of factors, such as parental

provision of medication, significant pharmaceutical company advertising, and a general acceptance that over the counter medication is an appropriate response to the treatment of a range of minor ailments, changes to normal practice are not sustainable. Behaviour change is probably more difficult to produce when saturation point, regarding use of analgesics, has already occurred.

The next chapter examines the differences between intervention and non intervention group use of substances such as marijuana, opiates, inhalents and hallucinogenics. In view of the fact that intervention group subjects do not appear to have progressed as far or as fast as non intervention group subjects in legal drug use it would be anticipated that in accordance with Hypothesis 3 reduced incidence and levels of illegal drug use would be recorded.

Chapter Twelve: A Comparison of Intervention and Non-Intervention Group Use of Illegal or Non-Prescribed Substances and Age of Onset for Drug Use

This chapter examines the nature of illegal drug use or use of non-prescribed substances for both intervention and non intervention group subjects. Despite being an illegal drug, marijuana is one of the most common drugs used in adolescence. The use of other illegal substances, such as opiates and hallucinogenics are much further along a developmental progression of drug use. Because data collection concluded in Grade 10, use of these substances may continue at some later stage. The main focus of Hypothesis 3 will be tied to a comparison between intervention and non-intervention groups' use of marijuana. Initially only marijuana use will be discussed. The use of opiates, hallucinogenics and inhalants will be examined later in the chapter.

A final set of analyses examining the group differences between intervention and non intervention age of onset for drug use has been conducted. Hypothesis 4 has suggested that intervention group subjects would, in comparison to non intervention group subjects, delay their initiation into drug use.

In the Grade 6 pre-test very few children report use of marijuana. No differences between intervention and non-intervention groups exist at Grade 6 with only 3.3% of intervention group subjects and 3.5% of non-intervention group subjects indicating that they have used marijuana ($z=-0.063$, $p=.949$). As age increases and illegal drug use begins to emerge, significant differences between groups can be observed (Table 12.1). By Grade 8 marijuana use increases sharply, with 26% of subjects indicating they have tried marijuana, as compared to 10% of intervention

group subjects. This pattern of differences continues to occur across all subsequent grades and is also apparent with regard to the number of times marijuana was used, both in the previous year and during the past month. Table 12.2 presents a comparison of intervention and non-intervention group use of marijuana during the previous year and the past month. Once marijuana use has started to increase in Grade 8 significant differences emerge between both groups. At the Grade 9 and Grade 10 stages intervention group yearly use of marijuana is approximately 15% lower than that recorded by the non-intervention group. The difference between groups at the monthly level of use is 10% or greater.

Table 12.1 Percentage of Subjects for All Groups and Grade Levels Who Have Ever Used Marijuana

	Grade Level	Not Used	Used
Intervention Group (N=150)	6	96.7	3.3
	7	96.6	3.4
	8	90.0	10.0
	9	83.1	16.9
	10	81.9	18.9
Non-Intervention Group (N=89)	6	96.5	3.5
	7	92.1	7.9
	8	73.9	26.1
	9	58.4	41.6
	10	55.7	44.3
Combined Sets of Responses (N=239)	6	96.6	3.4
	7	95.4	4.6
	8	84.1	15.9
	9	74.1	25.9
	10	72.4	27.6

Table 12.2 Levels of Yearly and Monthly Marijuana Use for All Subjects and Grade Levels

Group Level	Grade	Number of Times Smoked Marijuana Last Year							Number of Times Smoked Marijuana Last Month						
		No Use	1-2	3-5	6-9	10-19	20-39	40+	No Use	1-2	3-5	6-9	10-19	20-39	40+
Intervention	6	96.7	3.3	-	-	-	-	-	-	-	-	-	-	-	-
Group	7	96.6	.7	.7	1.3	1.7	-	-	97.3	2.0	.7	-	-	-	-
Responses	8	92.0	4.0	.7	.7	2.0	.7	-	94.0	3.3	1.3	.7	.7	-	-
(N=150)	9	86.0	3.3	3.3	1.3	2.0	2.7	1.3	87.2	6.0	2.0	2.7	1.3	.7	-
	10	86.0	6.0	2.0	1.3	1.3	.7	2.7	86.6	8.1	1.3	2.0	1.3	.7	-
Non-Intervention	6	96.5	3.5	-	-	-	-	-	-	-	-	-	-	-	-
Group	7	93.3	5.6	1.1	-	-	-	-	95.3	4.7	-	-	-	-	-
Responses	8	74.2	11.2	5.6	4.5	2.2	2.2	-	83.9	10.3	3.4	2.3	2.3	-	-
(N=89)	9	60.7	15.7	6.7	4.5	3.4	3.4	5.6	69.3	17.0	6.8	1.1	2.3	2.3	1.1
	10	64.0	12.4	6.7	3.4	4.5	3.4	5.6	72.7	15.0	1.1	3.4	2.3	2.3	2.3
Combined	6	96.6	3.4	-	-	-	-	-	-	-	-	-	-	-	-
Set of	7	95.4	2.5	.8	.8	.4	-	-	96.6	3.0	.4	-	-	-	-
Responses	8	85.4	6.7	2.5	2.1	2.1	1.3	-	90.3	5.9	2.1	1.3	.4	-	-
(N=239)	9	76.6	7.9	4.6	2.5	2.5	2.9	2.9	80.6	10.1	3.8	2.1	1.7	1.3	.4
	10	77.8	8.4	3.8	2.1	2.5	1.7	3.8	81.4	11.0	1.3	2.5	1.7	1.3	.8

12.1 A Comparison of Intervention and Non-Intervention Group Rates of Change in Marijuana Use Measured Across All High School Grades Relative to Grade Six.

No monthly marijuana usage levels were recorded at Grade 6 as only 3% of subjects at this age indicated they had ever tried marijuana. Therefore yearly drug use scores have been used to provide a baseline comparison. Monthly use of marijuana is probably close to zero so the use of this baseline starting point provides a relative basis from which the two groups can be compared. A rate of change analysis for both yearly use of marijuana and monthly use of marijuana shows that by Grades 8 and 9, when usage has increased, significant differences between the two groups begin to occur (Table 12.3). From Grade 8 through to Grade 10 yearly rates of change differences emerge, whilst at the monthly rate of change level significance is not achieved until one year later, in Grade 9. It must be pointed out, however, that at Grade 8 a clear trend, in line with later developments becomes apparent and intervention group subjects use significantly less marijuana. The averaged effect, calculated across all grade levels, indicates that there is a significant difference in the way the two groups behave, both for yearly marijuana use ($z=-3.75$, $p<.001$), and for monthly use of marijuana ($z=-2.27$, $p<.02$).

12.2 A Comparison of Intervention and Non-Intervention Growth Curve Models For Marijuana Use.

Growth curve models for intervention and non-intervention groups were calculated for both yearly and monthly levels of marijuana use (Table 12.4). A predominantly linear trend was visible for both monthly and yearly use of marijuana for both groups.

Table 12.3 Mean Rate of Change Analysis: Measures of Change in Drug Taking Behaviour Over 4 Years Relative to Grade 6 Baseline (Mann-Whitney U test z scores, N=239)

Grade Level	Marijuana Use Last Year	Marijuana Use Last Month
Grade 6	-0.06 (.95)[a]	-0.06[b] (.95)
Grade 7-6	-0.64 (.52)	-0.45 (.65)
Grade 8-6	-3.08 (.001)	-1.59 (.055)
Grade 9-6	-3.32 (.000)	-1.70 (.045)
Grade 10-6	-3.79 (.000)	-1.78 (.04)
Averaged Effect Calculated Across All Grades	-3.75 (.000)	-2.27 (.01)

[a] Figures in parentheses are probabilities.
[b] No monthly usage was recorded at Grade 6 and the yearly use score has been substituted for comparison.

Table 12.4 Analysis of Growth Curve Models for Intervention and Non Intervention Group Use of Marijuana (Mann-Whitney U test, z scores)

	Marijuana Use Ever		Monthly Marijuana Use	
	Intervention	Non Intervention	Intervention	Non Intervention
Polynomial of Order Four	-0.84	-0.13	-1.08	-1.25
Polynomial of Order Three (cubic)	-1.71	-0.84	-0.06	-0.60
Polynomial of Order Two (quadratic)	-1.24	-2.85**	-0.64	-0.37
Polynomial of Order One (linear)	-4.68**	-5.58*	-2.73**	-2.54*

*p<.05, **p<.01

A comparison of yearly levels of marijuana use for all categories of users (lower quartile,median and upper quartile) indicates that at each grade level, after the intervention phase, intervention group drug use is lower than that of the non-intervention group. Figure 12.1 indicates a very clear linear trend for both groups, but a quadratic term is also observed in both lower and median levels of use for the non-intervention group. The lower quartile for the intervention group is not plotted, as zero usage levels occur. Median levels of yearly marijuana use, whilst slightly apart, merge at the end of Grade 10 for both groups and no significant differences emerge across all comparison points. The fact that most usage occurs in the upper quartile suggests that a fairly clear division may occur between the bulk of non users and a small group of users who become fairly active.

Only upper quartile use of marijuana, at the monthly level, has been graphed in Figure 12.1 because median and lower quartile levels of use are at near zero levels. Intervention group upper quartile users of marijuana appear to use marijuana less frequently each month than is the case for non-intervention group subjects. At Grades 6, 7 and 8 differences in monthly marijuana use are only marginal. Although for both Grades 7 and 8, intervention group use is lower than that of their non-intervention group counterparts. By Grades 9 and 10, considerable differences exist between upper quartile levels of monthly use. Non-intervention group subjects have increased their usage considerably.

The upper quartile use patterns of the intervention group suggest that group members reject the general message of the intervention program, but their progress into regular use is still delayed in comparison to the non-intervention group's fairly rapid progression into

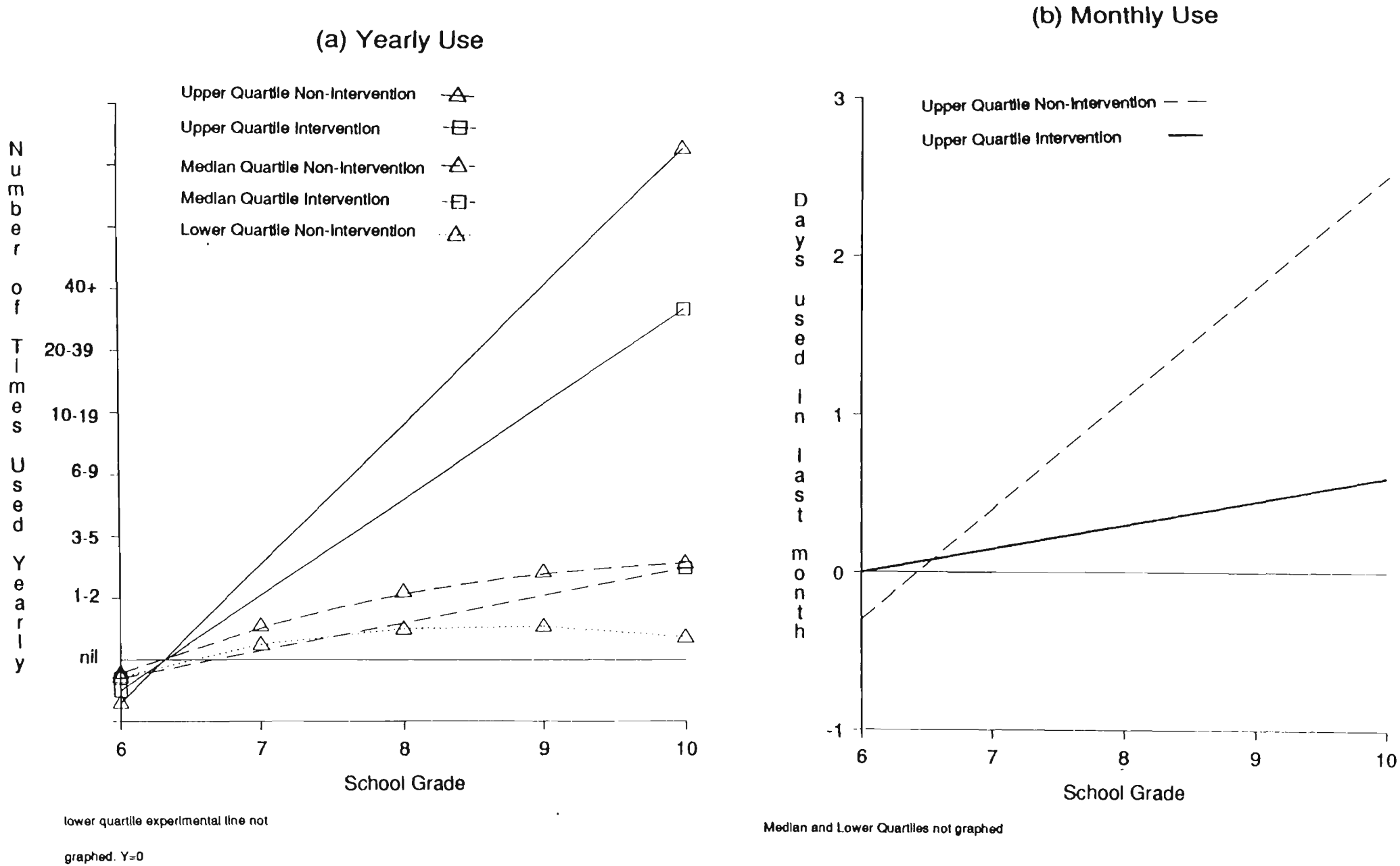


Figure 12.1 (a.b) A comparison of yearly and monthly marijuana use by intervention and non-intervention subjects.

use. It is difficult to forecast what happens after Grade 10 and it may well be that upper quartile intervention group usage overtakes the levels of marijuana usage of non-intervention group subjects. The slower progression into more frequent use may well be beneficial.

12.3 A Comparison of Intervention and Non-Intervention Use of Marijuana With the Cross-Sectional Sample.

In general the comments made earlier with regard to the longitudinal sample are equally true at the cross-sectional level of analysis. However less variability between groups is observed in the larger cross-sectional group. Grade by grade comparisons of marijuana use with the larger cross-sectional group still show significant differences between intervention and non-intervention group use of marijuana but levels of significance tend to be slightly reduced. At the Grade 6 pre-test no significant differences exist between groups ($z=-0.56$, $p=.57$) with regard to use of marijuana in the previous year. Monthly rates of usage were not recorded as only about 3% of students had ever used marijuana at this age. A comparison of the number of times that marijuana was used in the previous year (Table 3, Appendix 5) indicates that from Grade 7 onwards, until the conclusion of data collection in Grade 10, significant differences between groups emerged consistently. At the monthly level Grade 8 differences were significant ($z=-2.64$, $p=.004$), but at Grade 9 these differences did begin to fade ($z=-1.84$, $p=.04$). This continued to happen in Grade 10 ($z=-1.58$, $p=.06$). Complete tables recording incidence and frequency of use are presented in Appendix 5.

12.4 Conclusions Regarding Group Differences in the Use of Marijuana

The analyses conducted with both the longitudinal and cross-sectional samples indicated that quite significant differences exist between intervention and non-intervention group subjects with regard to the general incidence of marijuana use as well as the frequency and levels of use. The null hypothesis was therefore rejected as there are significant differences between groups with regard to the actual incidence of drug use. Hypothesis 2a was accepted. Hypotheses 2b and 2c examine the frequency of drug use and the amount or quantity of each drug used. Because marijuana use is not tied to any reliable form or method of estimating the quantity of drug use, the specific question used for the analysis examines both frequency and, to some extent, amount, as it asks about the number of times (rather than the number of days) each month or year that the substance has been used.

Significance levels tend to vary somewhat depending on the specific question asked. Hypotheses 2b and 2c are supported quite clearly when the frequency or level of marijuana use being examined is set at the yearly comparison point. The longitudinal samples rate of change for monthly marijuana use vary at each grade level, but are generally significant at the .05 level. The averaged effect for the rate of change calculated across all grades brings into perspective the relative magnitude of intervention and non-intervention group differences for both yearly marijuana use ($z=-3.75$, $p.<.001$) and monthly marijuana use ($z=-2.27$, $p<.01$). These findings are equally true for the larger cross-sectional analyses as significance levels from Grade 8 onwards are either below .01 or between .01 and .06. The results support Hypotheses 2a, 2b

and 2c in establishing a statistically significant difference in incidence of use and frequency, or level of marijuana use, between groups.

12.5 Intervention and Non-Intervention Group Use of Other Illegal (or Non-Prescribed) Substances

A comparison of the degree to which inhalants, opiates and hallucinogenic drugs, such as magic mushrooms and L.S.D., have been used by both groups has been examined. No Grade 6 pretest was, in fact, included at the time of program preparation and delivery because school authorities were particularly concerned about raising awareness, regarding little used and potentially lethal substances. In consequence permission was refused to include questions about such drugs in a Grade 6 survey.

The results, with regard to the use of opiates and hallucinogens at Grade 7, however, suggest that considerably less than 1% of children in Grade 6 would have tried such substances and it would be quite feasible to consider a Grade 6 incidence rate of zero as realistic in view of the fact that only 0.5% of all subjects report ever having tried opiates and 1.5% ever having tried hallucinogenics at Grade 7. In view of these incidence figures Grade 7 data will be used as the baseline for rate of change analyses. The same form of analysis previously used with tobacco, analgesics and marijuana will also be used with these infrequently used substances.

Table 12.5 permits comparison of the percentage of subjects for all groups and for all grade levels who have ever used inhalants, hallucinogenics and opiates. At the commencement of data collection in Grade 7, opiate use and hallucinogenic use are fairly similar for each

group. As age increases experimentation with illegal substances tends to rise, so that by Grades 9 and 10 3.6% and 5.4% of individuals have tried opiates and hallucinogenics, respectively. The pattern is not the same for the use of inhalants, however, and use increases steadily between Grade 7 and 8 and then slowly recedes, until by Grade 10 the percentage of users has fallen from a high of 16.4% in Grade 8 to 10.6% in Grade 10.

Table 12.5 Percentage of Subjects for all Groups and Grade Levels Who Ever Used Inhalents, Hallucinogenics and Opiates

Group	Grade Level	Inhalent Use Last Year		Hallucinogenic Use Ever		Opiate Use Ever	
		Used	Not Used	Used	Not Used	Used	Not Used
Experimental Group (n=150)	7	91.9	8.1	99.3	.7	100	0
	8	86.6	13.4	98.7	1.3	98.7	1.3
	9	83.8	16.2	96.6	3.4	96.6	3.4
	10	91.9	8.1	97.9	2.1	97.9	2.1
Control Group (n=89)	7	86.0	14.0	98.8	1.2	98.9	1.1
	8	78.7	21.3	96.6	3.4	94.4	5.6
	9	85.2	14.8	92.1	7.9	92.1	7.9
	10	85.1	14.9	89.9	10.1	93.0	6.1
Combined Set of Responses (n=239)	7	89.7	10.3	99.1	.9	99.6	0.4
	8	83.6	16.4	97.9	2.1	97.1	2.9
	9	84.3	15.7	95.0	5.0	95.0	5.0
	10	89.4	10.6	94.6	5.4	96.4	3.6

In almost all grades and for all categories the intervention group's level of drug use remains lower than that of the non-intervention group. The only exception to this general pattern appears to occur in Grade 9, when the use of inhalants by intervention group subjects was marginally higher (by approximately 1-2%) than that of the non-intervention group. By Grades 8 and 9 non-intervention group use of hallucinogenics and opiates was approximately twice that of the intervention group, and by Grade 10 the size of the differences between groups continued to rise

even further. Inhalant use by the non-intervention group was generally higher than that of the intervention group, but differences are generally much smaller than those seen for the other two substances (Table 12.5)

At Grade 7, no significant differences between groups is found for all three drugs (inhalants, z=-0.85, p=.40; hallucinogenics, z=-0.39, p=.69; and opiates, z=-1.30, p=.20). No significant differences between intervention and non-intervention group rates of change relative to Grade 7 were noticed for inhalant use, but significant differences were noted for use of hallucinogenics and opiates when the average effect calculated across all grades was examined (see Table 12.6). At each of the discrete grade level stages no significant differences for opiate use were recorded, with the exception of the Grade 8-7 result measured at a 1-tailed level. As subjects increase in age, hallucinogenic use differences between groups emerged. At both Grades 9 and 10, comparisons indicate significantly lower rates of change for the intervention group. It is important to note that for all three drug use categories, intervention group drug use behaviour was generally lower (as indicated by the minus z scores) than the levels of use recorded by non-intervention group subjects. As the number of subjects involved in the use of inhalants, hallucinogenics and opiates is generally fairly low, and because no Grade 6 baseline figure is provided, the nature of the growth curve for these drugs was not examined or plotted.

12.6 Analyses of Intervention and Non-Intervention Group Use of Inhalants, Hallucinogenics and Opiates Conducted with the Cross-Sectional Sample.

A grade by grade comparison of inhalant use with the larger cross-sectional sample (Table 4, Appendix 5) provides a similar picture to that

Table 12.6 A Rate of Change Comparison Examining the Use of Inhalants, Hallucinogens and Opiates by Intervention and Non-Intervention Group Subjects (Longitudinal Sample, N=239)

Grade Comparison	Inhalant Use Last Year	Hallucinogenic Use Ever	Opiate Use Ever
Grade 7 (intervention vs. non-intervention) (baseline)	-0.85 (.40)	-0.39 (.69)	-1.30 (.20)
Grade 8-7	-.47 (.32)	-1.32 (.10)	-1.70 (.05)
Grade 9-7	-.84 (.20)	-1.64 (.05)	-1.06 (.15)
Grade 10-7	-.54 (.30)	-2.50 (.01)	-1.04 (.15)
Average calculated across all grades	-.26 (.40)	-3.0 (.001)	-2.1 (.02)

Figures in parentheses are probabilities for a Mann-Whitney test at the 1-tailed level of significance
Grade 7 probability levels are given at the 2 tailed level

just described. The overall impression that can be gained from examination of Table 12.6 is that a very noticeable trend towards reduced use of inhalants, hallucinogenic drugs and opiates by the intervention group has occurred. Although not significant, the non-intervention group's use of inhalants and hallucinogenic substances is somewhat higher than that of the intervention group, at the Grade 7 baseline. It is not possible, because there is no Grade 6 pretest baseline, to draw any firm conclusions from this particular set of results regarding the impact of the intervention program. It is, however, possible to underline the fact that intervention group subects appear to use illegal substances significantly less than non-intervention group subjects.

12.7 Conclusions Regarding the Levels of Illegal Drug Use by Intervention and Non-Intervention Groups

Marijuana is one of the four most commonly used drugs in adolescence, but it is also an illegal substance and therefore both Hypothesis 2 and Hypothesis 3 can be considered in this section. Hypothesis 3 anticipates that intervention group use of illegal substances will be significantly reduced in comparison to the non-intervention group. Although the use of illegal substances might be expected to continue beyond the school leaving age, marijuana use may at this point in time best indicate the ability of the program to curb illegal drug use. Marijuana use is generally considered to be midway between legal and other illegal drugs, in terms of a developmental progression, and it could therefore indicate possible trends with regard to the future use of other illegal substances. Although the use of other illegal substances has been examined (inhalants, hallucinogens, and opiates) and emerging trends have been identified, the incidence of reported use is still quite small and it is difficult to draw any firm conclusions from such levels of use with a small sample. It is also difficult to examine the impact of the intervention program on the use of these illegal substances, because no pre-intervention baseline data were obtained. For these reasons a decision to support or reject Hypothesis 3 has been based largely on the program's ability to reduce or control marijuana use and less significantly on its ability to control the use of substances which are considered to be further along a developmental continuum of drug use.

The results of analyses conducted primarily with marijuana (and to a lesser extent with hallucinogenics and opiates) suggest that Hypothesis 3 has been supported. Inhalant use does not differ greatly between groups but, in general, intervention group use is lower than that of non-

intervention group subjects. Hypotheses 2a, 2b and 2c have also been supported, as marijuana use, in terms of incidence and frequency or rate of use, are significantly lower for intervention group subjects than for non-intervention group subjects.

12.8 A Comparison Between Intervention and Non-Intervention Group Decision to Commence Drug Use (Age of Onset)

Previous analyses have examined the nature of recruitment to drug use, but Hypothesis 4 examines the possibility that there will be a delayed onset for intervention group subjects, in comparison to non-intervention group subjects, for the use of alcohol, tobacco and marijuana. These three drugs are, in conjunction with analgesics, the most commonly used drugs in adolescence and therefore they are the most applicable substances on which to test this hypothesis. Analgesic use in Grade 6 is already at saturation point, however, with approximately 95% of all subjects having commenced use of these substances. Analgesic use was therefore not included in these analyses. Illegal drugs were also not examined, as these substances are only used by a small percentage of the sample.

Table 12.7 examines the age of onset for all subjects for alcohol, tobacco and marijuana use. As more students, at each succesive grade, begin to experiment with drugs, changes in the age of onset have been measured. There are no significant differences between intervention and non-intervention group onset into alcohol use. The lack of significant group differences may be attributable to the fact that, in general, experimentation with alcohol does not carry with it the same kinds of social injunctions regarding non-usage that are often linked to the use of

tobacco and marijuana. In addition, it must be pointed out that the intervention program did not promote abstinence from alcohol, but rather proposed the goal of responsible and limited alcohol use. Although there is no difference between groups with regard to the age at which alcohol is first consumed, significant differences do emerge for the use of tobacco and marijuana.

Table 12.7 A Comparison Regarding the Age at Which Intervention and Non-Intervention Group Subjects Commence Use of Alcohol, Tobacco and Marijuana (Mann-Whitney U test z scores)

Grade at School (longitudinal subset N=239)	Ever Used Alcohol		Ever Used Tobacco		Ever Used Marijuana	
	z	p	z	p	z	p
Grade 6	-1.32	.94	-0.17	.435	-0.06	.949
Grade 7	-0.75	.23	-4.35	.000	-1.92	.028
Grade 8	-0.76	.23	-4.22	.000	-3.32	.001
Grade 9	-0.95	.172	-3.29	.001	-4.32	.000
Grade 10	-1.37	.085	-3.57	.000	-4.67	.000

At the pretest in Grade 6 no significant differences were noted between intervention and non-intervention group ages regarding early onset of tobacco use but by Grade 7 significant differences have appeared. These differences are present throughout all data collection stages in High School. The same picture emerges with regard to the age of onset for marijuana use. At Grade 6 approximately 3% of students have tried marijuana and there were no differences with regard to group status but, as marijuana use begins to increase during Grades 7, 8 and 9, significant differences emerge between groups with regard to levels of recruitment to marijuana. Intervention group subjects, in comparison to non-intervention group subjects, commence use of both tobacco and marijuana at a later grade.

These results do not fully support Hypothesis 4 because no significant differences between groups emerged with regard to alcohol use. The fact that significant differences do emerge regarding delayed onset of drug use with regard to tobacco and marijuana is probably more important, however, and in consequence Hypothesis 4 is considered to have partial support.

The next chapter provides information on the way that a number of variables such as socio-economic status, gender and involvement in sports and hobbies affect drug use and the ability to resist peer pressure. The chapter examines the relationship between all of these variables and intervention and non intervention group status on the nature of drug use behaviour.

Chapter Thirteen: The Relationship Between the Use of Drugs and Socio-economic Status, Gender, Intervention Status Involvement in Sports and Hobbies, and the Ability to Resist Peer Pressure .

In order to assess the effects of participation in various sports and hobbies, as well as the impact on drug use attributable to such factors as gender and socio-economic status, a series of analyses were conducted using logistic regression. Each of the previous chapters has examined the nature of differences between intervention and non-intervention group use of drugs. The analyses to follow estimate the contribution of all the independent variables identified above (i.e. socio-economic status, gender, intervention status and involvement in sports and hobbies) in the presence of each other on the dependent variables of drug use and the ability to resist peer pressure. For each model drug use was tested as a binary outcome variable with gender, socio-economic status, participation in the program and sporting participation or involvement in hobbies treated as explanatory variables. Most of the drug use variables were dichotomous (eg., have you ever smoked tobacco, have you ever smoked marijuana) and these variables were automatically coded as zero or one to represent no use or use. A number of other variables representing frequency of use or amount consumed were also included. They were also reduced to a binary outcome variable, where no use or minimal use was coded zero and moderate or heavy use was coded one.

Analyses were conducted with both the complete cross-sectional sample and the smaller longitudinal sample. However, in order to estimate more fully the effect of each predictor variable, only the results

from the largest and most representative sample will be fully reported in this chapter. Because subjects in the longitudinal sample have been present during all high school data collection points they are embedded in the larger group and represent, on average, approximately 53% of the total sample available for analysis at all high school grades. The results for both groups are very similar, although not identical. Where significant relationships are found in one group and not the other these relationships are usually found in analysis of the larger data set. It would generally be expected that analysis of a larger data set would produce more significant relationships than found with a smaller group. Where differences are established in the smaller group they generally fit in with the overall pattern of findings found with the larger cross-sectional sample. At the conclusion of this chapter Table 13.8 presents information about the findings from both the cross-sectional sample and the longitudinal sample across all grades and with all variables. In this way the trends in data across time and the correspondence that exists between groups are summarised.

13.1 The Nature of The Model Building Process Used In Order To Identify Significant Interactions Between Dependent and Independent Variables.

Logistic regression modelling was carried out using GLIM Systems Release 3.77 (Payne, 1986). Linear regression uses a maximum likelihood method of estimating the significance of a number of independent or predictor variables on a dependent variable (such as drug use). A stepwise procedure for the selection or deletion of variables within a multiple logistic regression model was used. Central to the

consideration of such a model is the estimation of the coefficients in the model and testing for their significance (Hosmer & Lemeshow, 1989). A series of separate analyses were conducted in order to determine which variables should be placed into the model to be tested. Each predictor variable (e.g gender, socio-economic status, etc) was tested for a simple main effect (p.<.05) in order to determine the significance of the relationship to the criterion variable of drug use. Single variables might have a very strong effect individually on the criterion variable, but have nothing useful to contribute in the presence of other variables. The analysis of simple main effects would also fail to reveal any interactions. The starting point for the model building process was the inclusion of all main effects and interactional effects. A backward elimination procedure was then employed, commencing first with the exclusion of higher order interactions that were non-significant, and then progressing to removal of non-significant lower order interactions. Interactions between variables were tested for significance in the presence of all other predictor variables or interactions in the model. If a significant interaction was found, the variables relating to that interaction were not excluded. Those variables that contributed nothing of significance were deleted until the final model contained only significant effects. A significance level of <.05 was used to eliminate variables until the most parsimonious model remained.

13.2. The Impact of Participation in Sports and Hobbies, Socio - Economic Status, Gender and Intervention Group Status on The Ability to Resist Peer Group Pressure To Use Tobacco, Alcohol and Marijuana (Hypothesis 4)

Table 13.1 presents final models for all subjects' ability to resist or succumb to peer pressure to take alcohol, to smoke tobacco or use marijuana. Co-efficient estimates and standard errors indicate respectively the nature of the relationship and the variability. A negative coefficient (estimate) indicates reduced levels of drug usage for subjects in the condition being examined. A positive coefficient points to subjects in this particular category using more, or being affected more, by the particular substance under investigation. The estimated coefficients for the independent variables in the model "represent the slope or rate of change of a function of the dependent variable per unit of change in the independent variable" (Hosmer & Lemeshow, 1989 p.38). The estimate provides a measure, therefore, of the adjustment to the response variable (eg drug use) that is required because of the effect of the predictor variable (in the presence of all other variables in the model).

A total of eight sporting activities and four hobbies as well as gender, socio-economic status and intervention group status were tested for inclusion in the model. The final model includes a total of six explanatory variables across all four high school data collection points that are significantly related to the criterion variable. At Grade 7 surfers, soccer players, and hockey players, succumbed more to peer pressure to take one of the three drugs than individuals who did not participate in these sports. Greater ability to resist peer pressure (as indicated by the negative estimates) occurs as a result of participation in the drug

Table 13.1 Results for Logistic Regression Analyses Examining Recreational Pursuits, Intervention Status, Gender and Socio-Economic Status on Self-Reported Failure to Resist Peer Pressure to take Alcohol, Tobacco or Marijuana

Parameter Estimates (± standards errors)[a] for Submitting to Peer Pressure to Use or to Use More Alcohol, Tobacco or Marijuana

Final variables in the model	Grade 7		Grade 8		Grade 9		Grade 10	
	Submitted to use	Used more	Submitted to use	Used more	Submitted to use	Used more	Submitted to use	Used more
	Parameter Estimates		Parameter Estimates		Parameter Estimates		Parameter Estimates	
Constant[b]	-0.68 (.17)	--	-.26 (.16)	-2.35 (.80)	-.60 (.09)	--	-.65 (.79)	-1.93 (.17)
Group (experimental)	-1.02*** (.23)		-0.53* (.20)	--	--	--	--	--
Surf	1.31** (.41)	--	--	--	.85** (.27)	--	--	--
Football Players	--	--	.76** (.26)	--	--	--	.79** (.26)	.87* (.33)
Soccer Players	.92*** (.26) (.60)	--	--	--	--	--	--	-1.26*
Cricket Players	--	--	--	.80* (.35)	--	--	--	--
Hockey Players	1.07* (.50)							

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

[a] Standard errors are reported in parentheses.

[b] The constant is a measure of the response or dependent variable with the effects of predictor variables removed.

education program. In Grade 8 those subjects who participated in the intervention program continued to show greater ability to resist peer pressure in comparison to individuals who were in the non-intervention condition. At this age subjects who were involved in rugby football (both codes) indicated that they had succumbed to peer pressure to use one of the three drugs, more than subjects who did not play football. Cricket players also indicated that, in comparison to non-cricketers, they were more likely to acquiesce to peer pressure to increase their drug use and use more of one or more substances. In Grade 10 individuals who participated in surfing were more likely to give way to peer pressure to use alcohol, tobacco or marijuana. Participation in football (both codes) also re-emerged as a significant variable in Grade 10. Footballers, in comparison to non-footballers, indicated greater likelihood of succumbing to peer pressure to drink alcohol or to refrain from drinking more alcohol.

With the exception of soccer in Grade 10, it would almost be possible to conclude that involvement in a number of team sports appears to be a factor in succumbing to peer pressure to use a number of commonly taken drugs. It would be premature at this stage, however, to accept such a hypothesis without more substantial support. Where variables such as hockey and cricket are identified in only one model as having explanatory significance, inadequate evidence exists to suggest that this may be little more than a transient phenomenon. However, where the variable appears in more than one grade, it may well be possible to tentatively suggest that, in the case of participation in football and surfing, there is evidence that these sports either unduly influence

young people to use drugs, or that participants succumb to peer pressure more easily than participants in a range of other activities. Only intervention group status emerged as a positive and quite possibly protective influence in the analyses conducted. No other sporting variables or leisure activities, as well as gender and socio-economic status, emerged as variables that had any significant influence on the ability of individuals to resist peer pressure.

13.3 The Ability of Intervention Group Subjects to Resist Peer Pressure.

The drug education program appears to have enhanced the ability of program participants to resist peer pressure in Grades 7 and 8. However, this ability clearly fades during Grades 7 and 8, until by Grade 9 it does not emerge as significant. This finding fits with previous analyses comparing drug use behaviour of both the intervention and non-intervention group and Grade 9 emerges as a time when program influence is considerably weakened. In previous analyses, however a positive program effect often re-emerged in Grade 10, but this does not appear to be the case with regard to resisting peer pressure. There may be an alternative interpretation, however, based on the possibility that once the intervention group had established itself as able to resist pressure, group members may in fact be placed under pressure considerably less than non-intervention group members. It is certainly true that intervention group subjects do use less of the three drugs being examined in these later years.

It is difficult to determine how often individuals succumb to peer pressure unless data were collected indicating the number of times they were pressured and their subsequent ability to resist such pressure. There could, of course, be considerable variation in responding to these questions. One possible criticism of the current research is the fact that no measures were obtained of how much pressure, or how frequently that pressure was applied before an individual succumbed. The data only represent the subject's response to a question that asked if he or she had ever succumbed to pressure to smoke, drink alcohol, or use marijuana. Not withstanding this criticism, however, it seems likely that involvement in the intervention program has strengthened the ability of individuals to withstand peer pressure to use drugs. Hypothesis 4 is therefore partially supported, as subjects who participated in the intervention program appeared to have greater success in resisting peer group pressure in comparison to subjects in the non-intervention group.

13.4 The Relationship Between Participation in Sports and Hobbies, Socio-Economic Status, Gender and Intervention Group Status on the Use of Alcohol

In order to examine Hypothesis 5, which states that subjects in the intervention group would, in comparison to the non-intervention group, be expected to show reduced frequency or intensity of drug use if involved in alternative activities such as hobbies or sports, a series of analyses were conducted. Each set of analyses examined the possible association between alternative activities and a number of different drugs in order to determine support or rejection for the hypothesis. It is important to restate that the alternatives to drug use hypothesis may be proven or unproven for all subjects who engage in alternatives behaviour

irrespective of whether or not they have been involved in an intervention program.

As alcohol use becomes widespread quite early in adolescence it is not surprising to find that no significant difference exists between groups, regarding the question of alcohol use. The only significant interaction between any of the explanatory variables and recruitment to alcohol use occurred in Grade 7 and Grade 8, when alcohol use is still building towards saturation point (Table 13.2). Surfers are identified as having commenced to use alcohol in greater numbers than non-surfers. Parameter estimates are positive for surfers and this indicates that compared to non-surfers, alcohol is used more at Grades 7 and 8. Standard errors, however, are very large, indicating wide variability in this group which contains a relatively small number of individuals. This finding is therefore questionable, unless other supporting evidence can be found to indicate that these results are not isolated examples.

Analysis of levels of weekly alcohol use may, however, provide additional evidence to support the notion that the alcohol use of surfers is indeed precocious. Student responses regarding weekly alcohol use were coded as either nil to moderate use (1-2 days per week), or as high to very high use (3-7 days per week). Surfers and footballers used alcohol more frequently than non-footballers or non-surfers. The analysis does not partition out the effects of surfers being footballers or vice versa. When the results for only one variable are reported (i.e. either surfing or football) the estimate of the drug use may well be somewhat higher due

Table 13.2 Results of Logistic Regression Analyses Examining the Interaction Between Gender, Socio-Economic Status, Intervention Status and Recreational Pursuits and the Use of Alcohol During Grades 7-10 at High School

Final Variables in the model	Parameter Estimates (± standard errors)[a] for Amount of Alcohol Used in Grades 7, 8, 9, 10					
	Grade 7 Weekly Alcohol Use Parameter Estimates		Grade 8 Weekly Alcohol Use Parameter Estimates		Grade 9 Weekly Alcohol Use Parameter Estimates	Grade 10 Weekly Alcohol Use Parameter Estimates
Constant[b]	1.61 (.14)	-2.64 (0.3)	2.50 (.20)	-1.63 (.22)	-.80 (.12)	-.09 (.16)
Group (intervention group)		-1.18* (.50)		-.58* (.28)	--	-.60 (.20)
Surf	6.61** (7.01)	1.35 (.60)	6.72* (9.33)	--	1.16*** (.28)	.75*** (.31)
Football Players		--		.74* (.32)	--	.73** (.27)
Tennis Players		--		--	-1.22*** (.32)	--
Play a Music Instrument		--		--	-.94* (.45)	-1.29*** (.38)

* $p < .05$ ** $p < .01$ *** $< p < .001$

[a] Standard errors are reported in parentheses.

[b] The constant is a measure of the response or dependent variable with the effects of predictor variables removed.

to the extra influence of other covert variables (such as surfers being footballers). When both sports implicated in increased levels of drug use appear together in the same grade analysis, estimates more clearly represent the discrete effects of each sport. Surfers, and to a lesser degree footballers, appear to be seriously implicated in using alcohol more frequently than students engaged in other pursuits. The final model also indicates that intervention group subjects appear to use alcohol less frequently than non-intervention group subjects during Grades 7, 8 and 10. Individuals who play musical instruments at Grades 9 and 10, as well as tennis players in Grade 9, also appear to use alcohol less frequently than respondents who do not play musical instruments or play tennis at the respective grade levels. Gender and socio-economic status again were not identified as having anything of significance to contribute to the model.

13.5 The Importance of Basing Interpretations on the Emergence of Trends in the Data and not on Isolated Examples

If after examining several analyses of different drugs consistent trends emerge, then it may be possible to identify sports and hobbies that are either closely linked to drug use or that are only minimally linked or even opposed to specific categories of drug use. The next set of analyses focus on the use of tobacco.

13.6 The Relationship Between Gender, Socio-Economic Status, Intervention Status, Recreational Pursuits and the Use of Tobacco

The variables examined previously with regard to alcohol use were also examined for tobacco use. The results are presented in Table 13.3. Dependent variables examined use or non use of tobacco and levels of

Table 13.3 Results of Logistic Regression Analyses Examining Gender, Socio-Economic Status, Intervention Status and Recreational Pursuits, and the Use of Tobacco Across Grades 7-10 at High School

Parameter Estimates (± standard errors)[a] for Tobacco Use Ever and Weekly Use in Grades 7, 8, 9, 10

Final variables in the model	Grade 7 Ever used Est (Se)	Grade 7 Weekly use Est	Grade 8 Ever used Est	Grade 8 Weekly use Est	Grade 9 Ever used Est	Grade 9 Weekly use Est	Grade 10 Ever used Est	Grade 10 Weekly use Est
Constant[b]	.32 (.16)	-1.16 (.19)	.98 (.19)	-0.86 (.19)	1.44 (.19)	-1.83 (.29)	1.41 (.20)	1.43 (.28)
Group (intervention group)	-.86* (.21)	-1.40** (.30)	-1.04* (.22)	-1.17* (.26)	-0.9** (.21)	--	-0.83* (.24)	--
Surfers	1.63** (.56)	1.27** (.45)	1.11* (.47)		1.39*** (.42)	1.01*** (.29)	--	--
Football Players	.88* (.29)		.71* (.33)	0.65* (.30)			(.37)	1.01*
Joggers	--	-1.29 (.73)	--	-1.50** (.61)	-.65* (.29)			-1.29 (.54)
Tennis Players					-0.65** (.23)	-0.75 (.31)	--	-0.60 (.29)
SES						c		c

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

[a] Standard errors are reported in parentheses.

[b] The constant is a measure of the response or dependent variable with the effects of predictor variables removed.

[c] Where SES (socioeconomic status) is recorded as significant estimates and standard errors are not reported due to the complexity of a 5-way interaction. However when the terms are interpretable they are commented upon in the text.

weekly use of tobacco. Once again student responses were coded as either nil to moderate use (0, 1 or 2 days per week) or as high to very high (3-7 days per week). Surfers and footballers both had higher recruitment rates to tobacco use and also appeared to smoke tobacco more frequently than did non-surfers and non-footballers. It would appear that in Grades 7 and 8 surfers and footballers have started to smoke more tobacco, and have also begun smoking earlier than all other classifications examined. From an overall high school perspective both footballers' and surfers' smoking behaviour appears to be in excess of all other groups for three out of four grade stages.

Subjects who engaged in jogging and tennis used tobacco less than non-joggers and individuals who did not play tennis in Grades 9 and 10. At all four grades, intervention group subjects are less involved with tobacco use than non-intervention group members. Levels of weekly tobacco use are also significantly lower than weekly usage levels for non-intervention group subjects in Grade 7 and 8. Estimates of tobacco use for the intervention group are negative, and this indicates that, in the presence of all other variables in the model, less usage of tobacco occurs by subjects in the intervention group. Not only do subjects involved in the intervention program choose to remain abstinent more often than non-intervention group subjects, but, at least initially (Grades 7 and 8), those that do choose to begin smoking do not smoke as frequently.

There were no significant relationships involving gender or other recreational pursuits. However, a significant interaction ($p=<.05$) did occur in Grades 9 and 10 in relation to socio-economic status. Subjects,

whose parents were in the lower socio-economic groupings (unemployed and unskilled) appeared to use tobacco more frequently than subjects whose parents were in the high socio-economic category (professional group). Estimates for the lower socio-economic groupings were positive, indicating that subjects in these categories when compared to all other groupings tended to use tobacco more frequently. Standard errors were fairly large, however, and, because of the variability in the data, it is difficult to make definitive statements regarding the nature of the influence of socio-economic status.

13.7 The Relationship Between Gender, Socio-Economic Status, Intervention Status and Recreational Pursuits and the Use of Analgesics

Analyses examining relationships of the same set of predictor variables with the use of analgesics, identified no trends across all grades. There were no significant relationships between any of the explanatory variables placed in the model with analgesic use in Grade 7. Only tennis players were identified in Grade 8 as using analgesics more frequently on a monthly basis than individuals who did not play tennis. Because there were no other significant interactions involving tennis, no interpretation has been placed upon this finding. The same is also true in Grade 9 where, once again, a single isolated group (swimmers) has been identified as having greater monthly analgesic use.

Two explanatory variables are identified during Grades 9 and 10 that either increase or decrease the likelihood that analgesics will be used. Joggers, in comparison to non-joggers, appear to use analgesics less in both grades whereas gender (female) significantly increases the

likelihood that analgesics will be used. Because these findings, although not consistent across all grades, are more than isolated incidents, more confidence can be placed in these results (see Table 13.4).

13.8 The Relationship Between Gender, Socio-Economic Status, Intervention Status, Recreational Pursuits and the Use of Marijuana

Surfers and footballers appear to use marijuana more than non-surfers or non-footballers. Surfers recorded more use of marijuana in every grade category from Grade 7 through to Grade 10; and levels of significance for the relationships were generally at the .001 level of significance in the later grades (Table 13.5). The only other recreational category to be identified as using more marijuana was cricket and this occurred only in Grade 7 at an age when marijuana use is only just beginning to increase. This result can be interpreted as a random finding which has, at this stage, little or no importance within a wider picture of drug use. The same cannot be said for surfing and football as these sports have now been represented in three drug use categories and almost all age categories so far.

The positive benefits of involvement in the educational intervention program continue since in Grades 8, 9 and 10 intervention group members are less likely to have ever used marijuana than non-intervention group members. Involvement in tennis, and to a lesser degree in swimming, also appears to be positive as tennis players and swimmers either use less marijuana, or experiment less with this substance, in the later grades than do non-tennis players or swimmers. In Grade 9 a two way interaction occurs between tennis players and

Table 13.4 Results of Logistic Regression Analyses Examining Recreational Pursuits, Intervention Status, Gender and Socio-Economic Status on the Use of Analgesics During Grades 7-10 at High School

	Parameter Estimates (± standards errors)[a] for Ever Used and Monthly Use of Analgesics in Grades 7, 8, 9, 10							
	Grade 7		Grade 8		Grade 9		Grade 10	
	Ever Used	Monthly Use	Ever Used	Monthly Use	Ever Used	Monthly Use	Ever Used	Monthly Use
Constant[b]	--	--	--	-3.42 (.32)	2.63 (.27)	-2.61 (.19)	2.94 (.32)	-2.03 (.17)
Gender (female)	--	--	--	--	1.33** (.57)	--	1.82*** (.77)	--
Tennis Players	--	--	--	.99* (.49)	--	--	--	--
Joggers	--	--	--	--	-6.87* (12.8)	--	--	-1.67 (1.1)
Swimmers	--	--	--	--	--	.82 (.34)	--	--

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

[a] Standard errors are reported in parentheses.

[b] The constant is a measure of the response or dependent variable with the effects of predictor variables removed.

Table 13.5 Results of Logistic Regression Analyses Examining Recreational Pursuits, Intervention Status, Gender and Socio-Economic Status on the Use of Marijuana During Grades 7-10 at High School

Final variables in the model	Grade 7 Ever used Parameter Estimates	Grade 7 Monthly Parameter Estimates	Grade 8 Ever used Parameter Estimates	Grade 8 Monthly Parameter Estimates	Grade 9 Ever used Parameter Estimates	Grade 9 Monthly Parameter Estimates	Grade 10 Ever used Parameter Estimates	Grade 10 Monthly Parameter Estimates
	Parameter Estimates (± standards errors)[a] for Ever Used and Monthly Use of Marijuana in Grades 7, 8, 9, 10							
Constant[b]	-3.37 (.28)	-3.12 (.26)	-1.88 (.26)	-1.47 (.23)	-1.77 (.36)	-1.86 (.32)	-1.86 (.42)	-1.56 (.15)
Group (intervention)	-- --	-- --	-.85* (.34)	-1.11*** (.32)	-.74** (.25)	-- --	-.76** (.27)	
Group[c] and Tennis Players	--		--		-.177* (.63)		--	
Tennis Players	--	--	-1.81** (.73)	-1.66*** (.62)	--	-1.19** (.38)	-.98** (.36)	
Surfers	1.58* (.61)		1.41** (.34)		1.35*** (.32)	1.45*** (.30)	--	1.36*** (.32)
SES[d]	--		--		**	*	--	
SES and Surfers	--		--		--		*	
SES and Football	--		--		--		**	
Football	--	--	--	1.29*** (.32)	.52* (.27)	--	--	.97** (.29)
Swimming	--		--		-.71* (.34)	--	--	-.98* (.42)
Cricket	--	1.04* (.47)	--	--	--	--	--	--

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

[a] Standard errors are reported in parentheses.

[b] The constant is a measure of the response or dependent variable with the effects of predictor variables removed.

[c] Where 'and' is used it denotes a 2-way interaction between the named variables.

[d] Where SES (socioeconomic status) is recorded as significant, estimates and standard errors are not reported due to the complexity of a 5-way interaction. However when these terms are interpretable they are commented upon in the text.

group status in predicting drug use. This finding suggests that being both a member of the intervention group, and a tennis player, confers significantly greater ability ($p=<.01$) to not use marijuana than is the case for non-tennis and non-intervention group subjects alone.

In Grade 10 an interaction between participation in football and socio-economic status occurs with regard to increased levels of marijuana use. All socio-economic status categories, except for the children of professionals, appear to try marijuana more than the other socio-economic status groupings. Standard errors are again very high and therefore little confidence can be placed on these conclusions which are, at best, tentative. They may be almost uninterpretable due to the complexity of a five-way interaction with a small sample size. The same can be said of all the other interactions which occur in Grades 9 and 10, where all categories of socio-economic status interact with surfing to increase the likelihood that experimentation with marijuana may occur.

13.9 The Relationship Between Gender, Socio-Economic Status, Intervention Status, Recreational Pursuits and the Use of Inhalants and Illegal Drugs

In Grade 9 tennis and soccer players appear to have sniffed substances less than non-tennis players or non-soccer players (Table 13.6). Because these two sporting categories only appear once it would be improper to make any interpretive comment. However, it needs to be noted that involvement in the sport of tennis has been noted as positive and protective with regard to three other drug use categories (alcohol, tobacco and marijuana use).

Table 13.6 Logistic Regression Analyses Examining Recreational Pursuits, Intervention Status, Gender and Socio-Economic Status on the Use of Inhalants During Grades 7-10 at High School

Final variables in the model	Grade 7 Ever used Parameter Estimates	Grade 7 Last year Parameter Estimates	Grade 8 Ever used Parameter Estimates	Grade 8 Last year Parameter Estimates	Grade 9 Ever used Parameter Estimates	Grade 9 Last year Parameter Estimates	Grade 10 Ever used Parameter Estimates	Grade 10 Last year Parameter Estimates
	Parameter Estimates (± standard errors)[a] for Inhalant Use Ever and Inhalant Use Last Year							
Constant[b]	--	--	-.99 (.16)	-2.01 (.19)	-.89 (.17)	--	-1.02 (.15)	--
Gender (female)	--	--	-.55* (.23)	--	-.51* (.23)	-.63* (.32)	-.87*** (.25)*	-.95* (.41)
Tennis Players	--	--	--	--	-.57* (.29)	--	--	--
Soccer Players	--	--	--	--	.65* (.27)	--	--	--
Play a Musical Instrument	--	--	--	--	--	--	--	-.67* (9.67)

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

[a] Standard errors are reported in parentheses.

[b] The constant is a measure of the response or dependent variable with the effects of predictor variables removed.

In general, gender differences have not appeared to be particularly influential, with the exception of increased analgesic use by females in Grades 9 and 10. However, there are a number of gender differences that occur in relation to the use of inhalants, hallucinogenics and opiates. In Grades 8, 9 and 10 females have lower levels of experimentation with inhalants and hallucinogens. In Grades 9 and 10 females have tried opiates significantly less than males (Table 13.7).

In Grade 9 joggers have less involvement with opiates than non-joggers; whilst in Grade 10 netball players, in comparison to non-netball players, also have less involvement with both hallucinogens and opiates. Footballers at Grade 8 also appear to have less involvement with opiates than do non-footballers, yet for all three sports mentioned standard errors are extremely high. Without other supporting evidence, these findings should be considered as difficult to interpret or place confidence in. When standard errors are very high variability in the group under examination is considerable. Therefore it is not possible to talk of the findings as attributable to a relatively homogeneous group (eg., netball players etc). To draw conclusion, therefore, regarding a particular sport or category under such conditions is unwarranted.

In this final category of illegal drug use two other isolated results occur. In Grade 8 intervention group subjects, in comparison to non-intervention group subjects, have significantly less involvement with opiates than non-intervention group subjects; and in Grade 9 tennis players are significantly lower in their hallucinogenic use than non-

Table 13.7 Results of Logistic Regression Analyses Examining Recreational Pursuits, Intervention Status, Gender and Socio-Economic Status on the Use of Hallucinogenics and Opiates During Grades 7-10 at High School

	Parameter Estimates (± Standard errors)[a] for Use of Illegal Drugs in Grades 7, 8, 9, 10							
	Grade 7		Grade 8		Grade 9		Grade 10	
Final Variables in the Model	Hallucinogenics Parameter Estimates	Opiates Parameter Estimates	Hallucinogenics Parameter Estimates	Opiates Parameter Estimates	Hallucinogenics Parameter Estimates	Opiates Parameter Estimates	Hallucinogenics Parameter Estimates	Opiates Parameter Estimates
Constant[b]	--	--	-3.16 (.36)		-2.23 (.23)		-2.1 (.24)	
Gender (female)	--	--	-2.21** (1.03)	--	-0.98* (.42)	-1.53** (.56)	-1.14* (.45)	-1.67* (.64)
Group (intervention)	--	--	--	-1.45* (.68)				
Netball Players	--	--	--	--	--	--	-7.81** (13.3)	-7.27* (13.1)
Football Players	--	--	--	-7.27* (13.37)	--	--	--	--
Joggers	--	--	--	--	--	-6.31* (9.1)		
Tennis Players	--	--	--	--	-1.24* (.74)			

*p<.05 **p<.01

[a] Standard errors are reported in parentheses.

[b] The constant is a measure of the response or dependent variable with the effects of predictor variables removed.

tennis players. At these ages opiate use and hallucinogenic use is very minimal; and therefore the numbers of students fitting into both categories would be less than 3% of the total sample. This finding, therefore, can only be interpreted within very clear limits and should not be generalised beyond this research data.

13.10 A Summary of Findings Concerning The Association Between Recreational Pursuits, Intervention Status, Gender and Socio-Economic Status and Drug Use Behaviour

Table 13.8 presents an overview of all the results obtained at each of the high school grades. Explanatory variables found to be significant predictors of drug use at each grade level are reported in terms of increased or decreased levels of use relative to the pool of subjects available for analysis. In addition, Table 13.8 permits a comparison of results from the longitudinal sample with those from the larger cross-sectional sample. In almost all cases where differences occur between groups, the larger sample, because of its greater size, permits identification of a greater number of significant explanatory variables. The overall agreement between results from the groups is very high.

The complete set of findings presented across all grades and with all drugs permits more robust and representative conclusions to be drawn. Where explanatory variables are mentioned only once or twice across fourteen drug use categories at four different grade levels, insufficient evidence is presented to warrant drawing any conclusion regarding such findings and therefore these results will be ignored in the general overview. A number of fairly consistent findings have emerged

Table 13.8 Concordance Between Logistic Regression Analyses with the Complete Set (Total N=619) and the Longitudinal Subset (N=239) Examining Recreational Pursuits, Intervention Status, Gender and Socio-Economic Status on Drug Use During Grades 7-10 at High School

Variables identified for each data set and the nature of effect upon drug use (Increased use or Decreased use)

Drug Use Category	Grade 7		Grade 8		Grade 9		Grade 10	
	Cross-sectional Group	Longitudinal Subset	Cross-sectional Group	Longitudinal Subset	Cross-sectional Group	Longitudinal Subset	Cross-sectional Group	Longitudinal Subset
Alcohol use ever	surf+	surf+	surf+	–	–	–	–	–
Alcohol amount	surf+ interv group-	interv group-	interv group- football+	surf+	surf+ music- tennis-	surf+	surf+ interv group- football+ music-	surf and interv group
Tobacco use ever	surf+ interv group- football+	surf+ interv group- hockey+	surf+ interv group- football+	surf+ interv group- se.s.	surf+ interv group- tennis- jog-	surf+ interv group- se.s.	football+ interv group-	football+ interv group-
Tobacco weekly	surf+ interv group- jog-	interv group-	football+ interv group- jog-	football+ interv group- se.s.	surf+ tennis- se.s.	surf+ interv group-	tennis- jog- se.s.	interv group- se.s.
Analgesics use ever	–	interv group-	–	–	sex (f)+ jog-	tennis-	sex (f)+	–
Analgesic use monthly			tennis+		swim-		jog-	
Marijuana use ever	surf+	-	surf+ interv group- tennis-		interv group surf+ football+ group and tennis[a]- swim-	– -	interv group- tennis- se.s. & surf se.s. & football	

Table 13.8 (continued)

Drug Use Category	Grade 7		Grade 8		Grade 9		Grade 10	
	Cross-sectional Group	Longitudinal Subset	Cross-sectional Group	Longitudinal Subset	Cross-sectional Group	Longitudinal Subset	Cross-sectional Group	Longitudinal Subset
Marijuana use monthly	cricket+	–	tennis- interv group- football+	tennis- soccer- football+	tennis- se.s. surf+	tennis- interv group and sex (f) surf+	football+ swim- surf+	football+ interv group- surf+
Inhalent use ever		–	sex (f)-	–	sex (f)- soccer+ tennis-	sex (f)-	sex (f)-	football+
Inhalent use last year		–	–	–	sex (f)-	–	sex (f)- music-	surf+
Hallucinogenics ever		–	sex (f)-	–	sex (f)- tennis-		sex (f)- netball-	sex (f)-
Opiates ever		–	football- interv group-	–	sex (f)- jogging-	– –	sex (f)- netball-	– –
Submitted to peer pressure	surf+ exp group- soccer+ hockey+	surf+ interv group-	football+ interv group-	football+ interv group-	surf+	surf+ football+	football+	surf+ netball+
Pressured to use more	–	interv group-	cricket+	surf+		–	football+ soccer-	surf+ soccer-

+ Increased use of drug by this classification.
- Decreased use of drug by this classification.
a When 'and' is used it refers to a 2-way interaction.

from these analyses which suggest that an alternatives to drug use theory deserves much closer scrutiny.

Surfers and footballers appeared to consistently be linked to higher levels of drug use behaviour than was the case for non-surfers and individuals who did not play football. Increased drug use behaviour was particularly noticeable for these two recreational categories with regard to alcohol, tobacco and marijuana use. Use of these three drugs is common during recreational and social gatherings, so one possible explanation for increased use may be tied to the high levels of peer influence, modelling and peer pressure that can occur.

The two questions which examine the success or failure of individuals to deal with peer group pressure to use a drug or to increase levels of use also identify surfers and footballers as at greater risk of succumbing to peer pressure. The group that appears to have had some success in resisting such peer pressure is, in fact, the intervention group of this study. As subjects in this group have had some training in resisting peer pressure, this factor may well be significant in accounting for the intervention groups lesser involvement with three of the major drugs used in adolescence. The performance of the intervention group across most of the major drug categories has previously been examined. However, the results of the logistic regression analyses of binary outcome variables clearly support the program's effectiveness in controlling drug use behaviour. It seems quite possible that training intervention group subjects in decision making skills and peer resistance techniques may have helped individuals adopt a more moderate approach to the use of

alcohol, tobacco and marijuana.

13.11 Conclusions Regarding the Alternatives to drug Use Theory (Hypothesis 5)

Recreational sports that appear to be associated with reduced levels of drug use include tennis and, to a lesser extent, jogging. Jogging and tennis are sports which tend to be considered as individual and this may be an important factor, as peer influence would not normally be so strong. Surfing could, of course, also fit into this category. However surfers do generally form firm and tightly knit groups who, in their sport, provide security and support for each other in a more dangerous environment. One other possible factor that may provide a contrast between surfing and tennis, in particular, is the family involvement and adult supervision that often occurs in tennis clubs and the predominantly peer culture profile of surfing activity seen at most beaches.

In view of these findings Hypothesis 5a cannot be supported. Two of the major sporting alternatives available to adolescents in Australia have been linked to earlier levels of recruitment to drug use and, in a number of cases, to increased frequency or levels of use. There are indicators, however, that a number of other sporting activities may offer some degree of protection; but it is clear that a naive interpretation of an alternatives to drug use theory cannot be accepted without specifying precisely which drug is being targeted and which sporting or leisure activity is involved.

Hypothesis 5b must also be rejected, as there is little or no evidence that involvement in alternatives coupled with participation in the drug intervention program confers any greater protection on individuals than involvement with alternative activities alone. There is, in fact, only one significant two-way interaction in which intervention group status is linked with involvement in an alternative activity. This occurs in association with tennis and marijuana use in Grade 9. Although the combination of involvement in tennis and inclusion in the intervention group results in significantly lower use of marijuana, no other significant two-way interactions occur. Such a finding cannot, therefore, be used as a basis for supporting the hypothesis in view of both the earlier rejection of Hypothesis 5a and the lack of any other significant interaction between group status and participation in alternative activities.

13.12 Gender and Socio-economic Status as Influences on Drug Use

Gender and socio-economic status do not figure predominantly in most analyses as explanatory variables but gender differences do emerge in relation to analgesic use, inhalant use and illegal drug use. Female use of analgesics is significantly more than that of males in Grades 9 and 10, whereas female use of inhalants and illegal drugs is significantly less than that of their male counterparts. Perhaps because of gender stereotyping beliefs young girls are generally given self medication for various pains, whereas young males may be told to grin and bear it. Young girls are also less likely to engage in the same level of risk taking behaviour as boys. Illegal drugs and inhalants are generally considered to be substances that have higher levels of risk attached to their use and for this reason appear as less attractive to girls.

Socio-economic status is important mainly in relation to tobacco and marijuana use. Subject responses to relevant questions had been previously classified into six major socio-economic status groups; and although there were significant differences in drug use attributable to such status no clear patterns emerged. In each of the analyses where socio economic status emerged as a significant predictor variable the complexity of a five or six way interaction and the fact that standard errors were very often large meant that interpretation was generally not attempted.

The last research question that remains to be examined in this study has not been presented as an hypothesis. At this stage all hypotheses relevant to the ability of the intervention program to change drug use behaviour and attitudes have been explored. The final results chapter examines the relationship between attitudes to drug use and changes to drug use behaviour in order provide information regarding the importance of these relationships in the formulation and development of drug education programs.

Chapter Fourteen: The Relationship Between Attitudes to Drug Use and Progression from Non-use to Use of Tobacco, Marijuana and Alcohol.

Models examing the relationship between attitudes to drug use and drug use behaviour have suggested in general that attitudes do influence behaviour. Although a global attitudinal predisposition may not be specifically related to a single behavioural act, a relatively high correspondence is usually expected. Many drug education programs equate attitude change with subsequent behaviour change in view of such an expectation. An exploration of these relationships is important however, because it can permit an evaluation of the way that attitudes may change as adolescents move from non-use of certain drugs into experimental and possible ongoing use. Although it is anticipated that a relatively high correspondence between attitudes to drug use and the use of drugs would exist, the final research question has not been expressed in terms of an hypothesis, but rather in terms of an exploration of those relationships from a changing developmental perspective.

A number of factors, such as peer and parent modelling of drug use, and a range of other social and psychological factors have been considered by researchers who attempt to identify and estimate the relevance of multiple pathways to drug use. The analyses conducted, and discussed in this chapter, essentially leave unanswered questions regarding multiple causes of adolescent drug use and focus on the changing patterns of relationships that occur between attitudes to drug use and the progression from non use to use of certain drugs.

Models of attitude-behaviour relations in the past have been described using path analysis. Path analysis is basically concerned with estimating the magnitude of the linkages between variables, and using

these estimates to provide information about the underlying relationships and the relevance of the variables to each other. A series of multiple regression analyses were conducted with SPSS-X in order to generate the main path coefficients (standardized betas) for each of the models of attitude-behaviour relationship.

For each of three drug use categories (alcohol, tobacco and marijuana) attitude-behavioural models were calculated for non-users, continuous users (from Grades 7 to 10), and for subjects who commenced drug use at each discrete grade level. Each drug category was examined separately and path models for attitudes and behaviour across Grades 7 to 10 were included. Analgesic use was not examined because over 90% of subjects had already used prior to beginning high school.

In order to describe the entire structure of linkages between variables in a temporal order, separate path analyses were calculated at each grade level for attitudes to drug use and drug taking behaviour. Current drug use behaviour or attitudes to drug use and immediate past drug use behaviour and attitudes were entered into a regression model in order to retain path coefficients. Once path coefficients were obtained a minimum alpha level(<.05) was used to determine significance levels. Final models presented in this chapter include only those linkages which were identified as statistically significant. In addition residual path coefficients were also ascertained by ordinary regression analysis. The residual permits an evaluation of the accuracy of the regression equation, as the amount of unexplained variation associated with the response variable is indicated by the residual path coefficient ($1-\sqrt{R^2}$) and the explained variation is indicated by R^2. In the figures presented

in this chapter the path coefficients for each model appear above a single headed arrow linking each of the attitude and drug use behaviour stages. Figures in parentheses, above and below each attitude or drug use grade point represent residuals or error terms.

An examination of the relationship between attitudes to drug use and drug use behaviour was first conducted for tobacco and marijuana use. Neither of these drugs is widely used in early and mid adolescence, so it is theoretically possible to examine the nature of the relationship between attitudes to drug use and changing drug use status (i.e. before, during and after drug use has commenced). Experimentation with alcohol, on the other hand, is so prevalent in early adolescence that it is more difficult to track movement from non use to use. In Grades 7 and 8, for example, approximately 82% and 91% of students indicate, respectively, that experimentation has already commenced. Because of this, the variable of monthly alcohol use was examined in relation to attitude changes. Because experimentation with alcohol is already underway, it needs to be noted that attitude changes may already have occurred prior to establishing levels of monthly use. It was, therefore, considered appropriate to examine first the relationship between attitudes to drug use and the use of tobacco and marijuana as much clearer changes from non use to use could be measured. Subsequent reporting of attitude changes following increased use of alcohol could then be more usefully compared with trends that may have emerged from earlier analyses of other drugs.

14.1 An Analysis of the Relationship Between Attitudes to Drug Use and Tobacco Use as Subjects Progress from Non-Use to Use

A total of four separate regression analyses were conducted examining different groups of young people who commenced smoking in Grade 7, Grade 8, Grade 9 and Grade 10.

Figure 14.1(a) presents a path model of significant linkages that describe the relationship between drug use attitudes and tobacco use for subjects who smoked throughout all high school grades. The path coefficients suggest that there is a high degree of convergence and that linkages are consistently strong when current attitudes or behaviour are examined in relation to earlier attitudes and behaviour. Between 51% and 69% of the variance in the model is explained by attitudes and prior drug use behaviour. The signs of the correlation coefficients (standardized betas), whether positive or negative, indicate the direction of the relationship, whilst the value of the coefficient is an index of the relative strength of the relationship in the presence of the other variables placed in the regression analysis. The strength of the relationship between drug use behaviour at all data collection stages indicates that, once an individual has begun to smoke, previous drug use behaviour significantly predicts future drug use. The strength of the association between current tobacco use and past smoking behaviour appears to be stronger and more significant than either past or current attitudes.

In Grade 8, 61% of the variance explaining tobacco use behaviour is contained in the model. In Grades 9 and 10, 69% of the variance is explained. The magnitude of path coefficients between Grades 8, 9 and 10 is consistently high and residuals, or error terms, for both attitudes to drug use and tobacco use are generally quite low. If the error surrounding a particular attitude or drug use behaviour is very high, the

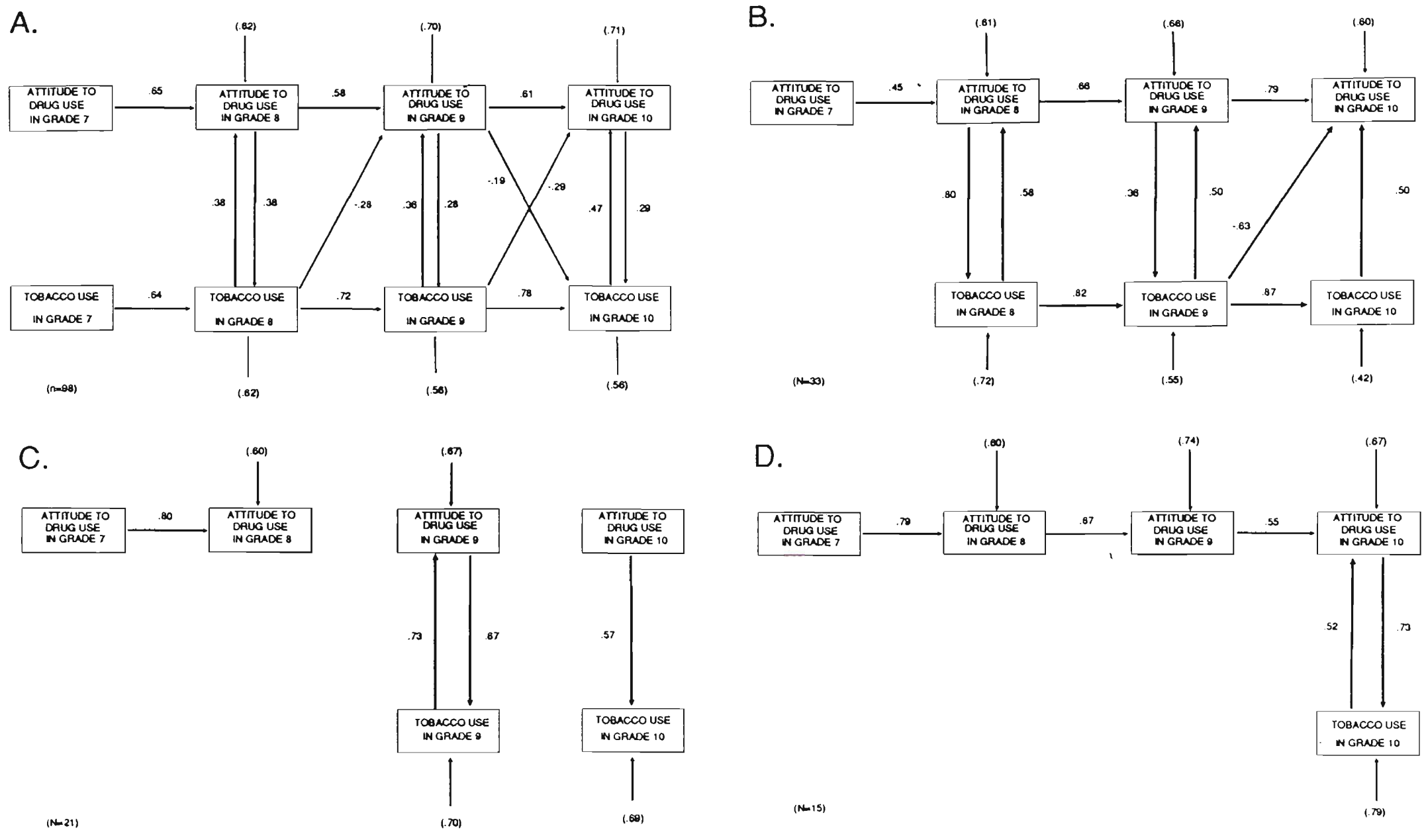


Figure 14.1 (a,b,c,d). Path analyses examining the relationship between attitudes to drug use and progression from non-use of tobacco to use of tobacco commencing in Grade 7 (fig. a), Grade 8 (fig. b), Grade 9 (fig. c) and Grade 10 (fig. d).

* figures in parentheses are residuals or error terms

variance explained by the proposed model is generally low and in such cases the implication is that factors not contained in the model may be needed to predict the particular variable under inspection. This is not the case with regard to the analysis of smoking behaviour presented in Figure 14.1(a), as attitudes and behaviour together generally appear to be significant predictors (between 51%-69% of variance is accounted for) of later attitudes and behaviour. Other factors, such as peer pressure, group membership and sporting or recreational pursuits could, of course, be factors that remain as essentially hidden and unexplained within the current path model.

14.2. An Analysis of the Relationship Between Attitudes to Drug use and Changing Tobacco Use Behaviour.

The next set of analyses presented in Figures 14.1(a, b and c) examine the nature of attitude-behaviour relations with regard to individuals who change their smoking status either in Grades 8, 9 or 10. When adolescents begin smoking tobacco in Grade 8 there appear to be quite clear changes in the magnitude of path coefficients before and after initiation into smoking. Immediately prior to drug use in Grade 8 the magnitude of the path coefficient (.45) is considerably lower than at later points following initiation into smoking (attitude Grades 8-9 = .66 and Grade 9-10 = .80). The path coefficient between attitude to drug use in Grade 7 and drug taking behaviour in Grade 8 did not reach significance (-.269 p=.097); but it is important to note that the sign of the coefficient is negative. Once tobacco smoking behaviour is established in Grade 8, significant path coefficients are recorded in subsequent years that once again indicate earlier drug use behaviour is a better predictor than previous or current attitudes. At the point of initiation into drug use (in

Grade 8), a high error term suggests that the variables placed in the regression model fail to adequately explain drug use. In Grades 9 and 10, once tobacco use has become established, the variance explained at each grade level by the regression model is considerably improved (69% and 82% respectively).

Where initiation into tobacco use commences in Grade 9 (Figure 14.1(c)), linkages are broken between attitudes at Grade 8 and 9. This discontinuity between earlier and later attitudes at the critical stage when tobacco use occurs suggests that a significant attitude change has taken place. Once such behaviour is established, attitudes and behaviour are related at each grade level, but earlier attitudes and behaviour appear not significantly related to subsequent attitudes or behaviour. Prior to tobacco use commencing at Grade 9, 64% of the variance in attitudes at Grade 8 is explained by Grade 7 attitudes. However, variance explained by the model drops significantly during initiation into drug use (55% and 51% by Grade 9). Once again the higher error terms suggest that factors, not included in the regression models, are active when tobacco use begins.

The final model presented in Figure 14.1(d) examines the relationship between attitudes to drug use and drug use behaviour, prior to, and during initiation into tobacco use in Grade 10. Path coefficients between attitudes prior to drug use are significant; but a similar pattern to the Grade 8 and 9 attitude-behaviour models emerges. Immediately prior to the point of initiation into tobacco use, the magnitude of path coefficients for attitudes begins to drop (.80, .67 and .55 at Grades 8,9 and 10 respectively). Between Grade 9 attitudes to drug use and Grade 10 commencement of tobacco use coefficients are not reported as they

are not statistically significant. However, it needs to be noted that the relationship is negative (-.41 p=.14). The variance explained at each point in the model also decreases. Attitudes to drug use, at each successive grade (8,9,10), are explained by prior drug use attitudes less adequately as drug use approaches (64% at Grade 8, 45% at Grade 9 and 55% at Grade 10). The variance explained in the model examining tobacco use behaviour in Grade 10 is only 38%. This again suggests that as anti drug use attitudes diminish, other forces not contained in the exploratory model (eg., peer pressure, association with others, involvement in sports and hobbies etc,) begin to emerge as factors that contribute to the decision to begin tobacco use.

It needs to be noted that all path analyses examined basically document an association, even when temporal order is known. Causal influence has not been established. A discernible relationship between attitudes to drug use and smoking behaviour does appear to exist. When there is a change in the magnitude of path coefficients, and they begin to drop or break, initiation into drug use occurs almost immediately.

Attitude scale means and standard deviations presented in Table 14.1 provide further insight into the changing nature of attitude and behaviour relations for each new group of drug users. Scale means prior to tobacco use are generally much lower than the mean attitude scale scores recorded at the time tobacco use commences. Grade 8 users' mean attitude scale score is 48.91, for example; whereas in Grade 7, prior to tobacco use, a mean attitude scale score of 41.88 occurs. Lower mean attitude scale scores are generally tied to anti-drug use sentiments whereas high scores imply pro-drug use beliefs.

Table 14.1 Attitude Scale Means and Standard Deviations for New Smokers, New Marijuana Users and New Monthly Users of Alcohol (Grades 7-10) and Non Users of Each Drug

	Grade at which Tobacco Use Starts						Grade at which Marijuana Use Starts						Grade at which More Regular Use (Monthly) of Alcohol Starts					
	Grade 8 (n=33)		Grade 9 (n=21)		Grade 10 (n=15)		Grade 8 (n=28)		Grade 9 (n=25)		Grade 10 (n=9)		Grade 8 (n=58)		Grade 9 (n=49)		Grade 10 (n=23)	
	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD
Grade 7	41.88	9.5	42.67	10.32	35.8	9.6	48.53	8.9	48.04	11.39	45.33	13.68	41.96	10.68	41.00	11.97	40.50	7.61
Grade 8	48.91	12.0	44.20	10.6	37.27	9.78	57.86	7.73	53.09	11.10	46.89	11.33	47.67	12.75	43.55	12.1	42.48	7.83
Grade 9	48.22	14.9	47.43	13.5	35.93	10.6	58.27	11.2	58.24	15.91	47.11	8.85	48.88	14.37	48.22	13.98	44.35	9.10
Grade 10	45.80	12.32	44.10	12.52	44.87	17.85	54.78	12.83	58.58	12.73	64.89	19.68	49.29	14.71	47.64	14.65	44.52	9.71

A comparison between the scores obtained by early onset smokers and late onset smokers clearly points to the significant changes in attitudes that are associated with tobacco use. The magnitude of mean attitude scale scores obtained by subjects whose entry into tobacco use occurs in Grade 8 is considerably higher than the scores obtained by smokers who start using tobacco in Grade 10. Between Grades 7 and 9 the mean attitude scale score of late onset smokers is between 6 and 12 points lower than the early onset smokers. Once tobacco use has commenced in Grade 10, however, the mean attitude scale scores for both groups are directly comparable; but it may be possible to suggest that as they have not been present for the same length of time these attitudes may be more amenable to change.

14.3 Analysis of Attitudes to Drug Use Held by Subjects who Begin to Use Marijuana

The same set of analyses conducted with tobacco were also carried out for marijuana use. The relationship between attitudes to drug use and marijuana use for individuals who have smoked marijuana in all four high school grades is presented in Figure 14.2(a). Between Grades 7 and 8 links between earlier and later attitudes to drug use, and between prior marijuana use and current Grade 8 marijuana use, are reasonably strong. No other relationships are significant, either between behaviour and attitudes in Grades 7 and 8, or between any other attitude or behaviour in subsequent grades. As subjects included in these analyses continue to use marijuana all through their school career, it appears likely that, after use has been well established in Grade 8, factors other than attitudes and previous drug use play a significant role. The number of subjects included in these analyses is small (N=11). Thus further speculation regarding this particular group is not warranted.

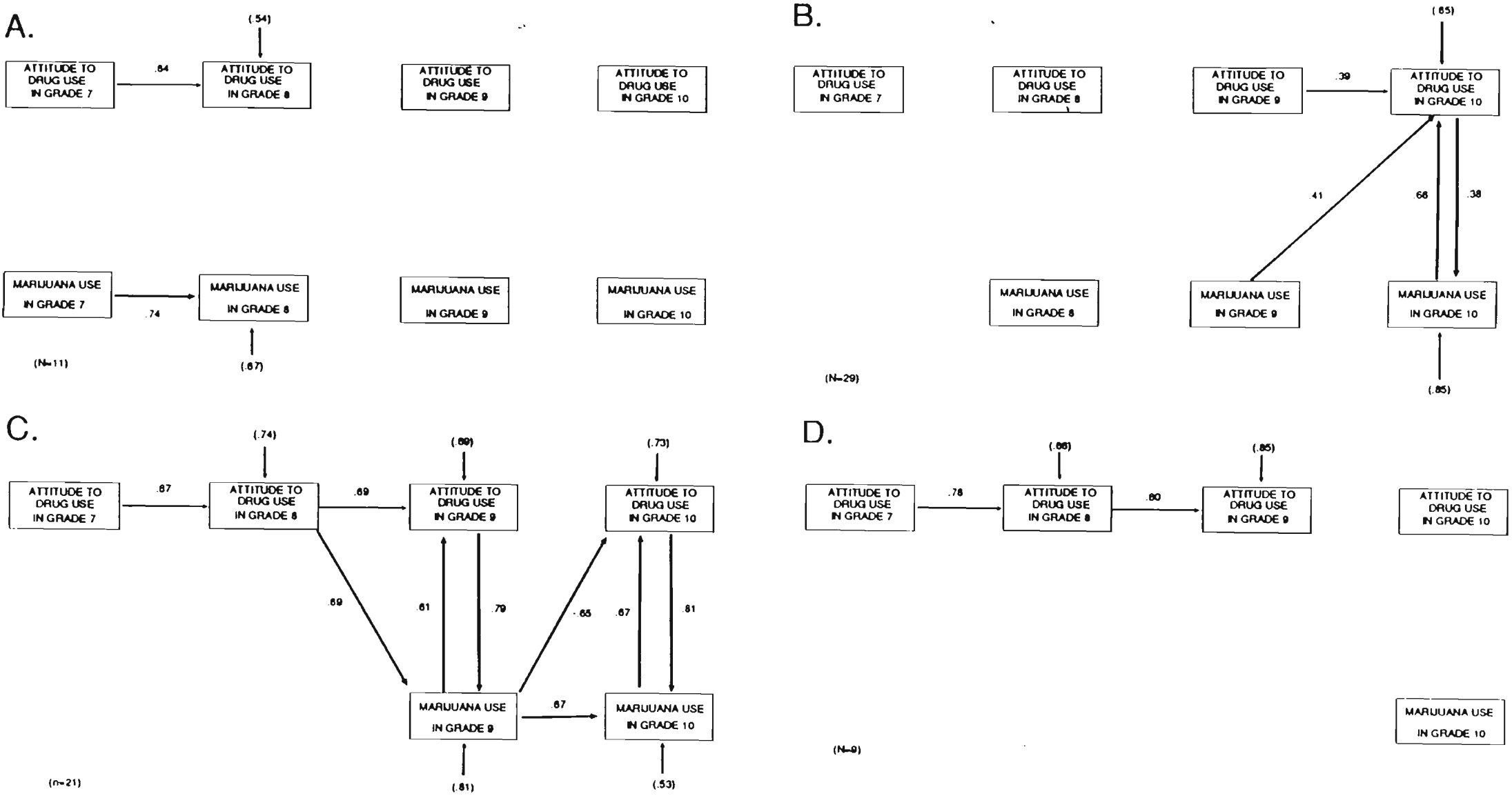


Figure 14.2 (a,b,c,d). Path analyses examining the relationship between attitudes to drug use and progression from non-use of marijuana to use of marijuana commencing in Grade 7 (fig. a), Grade 8 (fig. b), Grade 9 (fig. c) and Grade 10 (fig. d).

* figures in parentheses are residuals or error terms

The analysis of the relationship between attitudes to drug use and marijuana use for subjects who began use of marijuana in Grade 8 (Figure 14.2(b)), although larger in subject numbers (N=29), is difficult to interpret, as no significant linkages occur until Grades 9 and 10. Fifty-seven per cent of the variance is accounted for in relation to Grade 10 attitudes by prior attitudes in Grade 9 and current drug use behaviour in Grades 10. Only 27% of the variance in Grade 10 behaviour is attributable to Grade 10 attitudes. It appears quite likely that once again factors other than current or prior attitudes to drug use and past marijuana use play a significant role in determining and consolidating continued marijuana use. Such factors as peer group involvement or pressure, as well as involvement in hobbies or sporting groups may play an important role.

Figure 14.2(c) presents an analysis of the relationship between attitudes to drug use and marijuana use for subjects who began to use marijuana in Grade 9. Prior to the commencement of drug use, a strong association existed between Grade 7 and Grade 8 attitudes and between Grade 8 and Grade 9 attitudes. Once drug use became established in Grade 9 the linkages between Grade 9 and Grade 10 were broken. Marijuana use behaviour in Grade 9 is also negatively related to attitudes held at Grade 8, whilst current Grade 9 attitudes appear to be strongly associated with the commencement of marijuana use in Grade 9. Once marijuana use is established in Grade 9 subsequent use in Grade 10 is strongly predicted by earlier behaviour Forty seven percent of the variance regarding Grade 10 marijuana use is explained by previous marijuana use and current Grade 10 attitudes.

The final set of analyses examined marijuana use commencing in Grade 10 (Figure 14.2(d)). Grade 7 to 8 attitudes are significantly related but between Grades 8 and 9 the linkage is broken, although the regression coefficient approaches significance (.08). The variance explained at Grade 8 is 56%, whereas by Grade 9 less then 27% of the variance is explained by previous attitudes. Between Grades 9 and 10 linkages are completely severed, as attitudes appear to change prior to or at the stage when marijuana use commences.

Some similarity between path analyses models of tobacco use and marijuana use can be noted for both drugs. Either prior to drug use, or at the point of initiation, the size of path coefficients drop. Significant changes in attitude scale means are also recorded in Table 14.1. Prior to the use of marijuana, mean attitude scale scores begin to rise (indicating increasing pro-drug use attitudes) and they increase gradually as the onset of marijuana use approaches. Once marijuana use commences mean attitudes scale scores rise significantly in comparison to levels recorded earlier.

A comparison of mean attitude scale scores also reveals that pro-drug use sentiments (as revealed by higher mean attitude scale scores) are considerably higher for marijuana users than for any other drug use category. The implication of such a finding is that marijuana users may be more at risk for subsequent drug use, both for continued marijuana use and for the use of other drugs, than either of the other two groups, in view of the fact that they appear to hold disturbingly high pro-drug use attitudes.

14.4 An Analysis of the Relationship Between Attitude to Drug Use and Monthly Alcohol Use.

Because saturation point regarding ever having tried alcohol had been reached during the early high school grades, the variable of monthly use of alcohol was chosen in order to examine the association between a commitment to more regular alcohol use and attitudes to drug use in general. Figure 14.3(a) examines the relationship between attitudes to drug use and drinking behaviour for individuals who indicated that they have drunk alcohol during the last month at each of the four high school data collection points. Between Grades 7, 8 and 9 fairly strong relationships appear to exist between attitudes and drinking behaviour, as attitudes in Grade 8 predict Grade 9 attitudes, and monthly use of alcohol in Grade 8 also predicts subsequent Grade 9 alcohol use. In addition strong linkages exist between attitudes to drug use and drinking behaviour at each separate Grade (8 and 9).

Grade 7 attitudes to drug use appear significantly related to Grade 8 attitudes, but earlier alcohol use does not significantly predict subsequent use in Grade 8, although the level of significance recorded (.051) does suggest that there is an association. Approximately 54% of the variance regarding alcohol use behaviour at Grade 8 is explained by past behaviour and attitudes. It also appears that once monthly alcohol use behaviour that commenced in Grade 7 becomes established during Grades 8 and 9, strong relationships develop at each discrete time period. From Grade 7 to Grade 10 earlier attitudes to drug use appear to be quite closely related to subsequent drug use attitudes. At Grade 10 the link between earlier alcohol use behaviour and current attitudes to

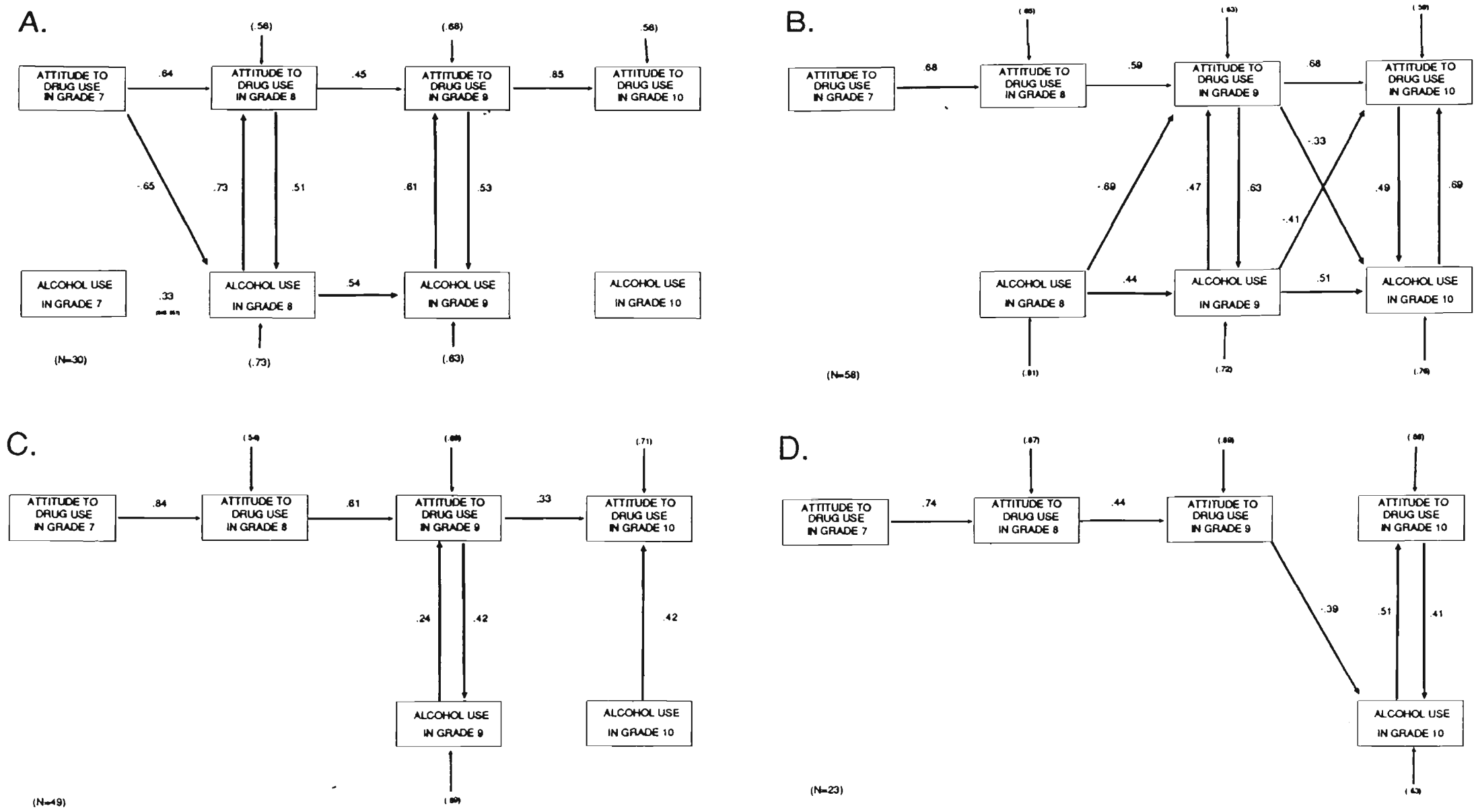


Figure 14.3 (a,b,c,d) Path analyses examining the relationship between attitudes to drug use and progression into monthly use of alcohol commencing in Grade 7(fig. a), Grade 8(fig. b), Grade 9(fig. c) and Grade 10(fig. d).

* figures in parentheses are residuals or error terms

drug use is completely broken, suggesting that at this stage well established drinking behaviour is almost certainly influenced by factors not included in the regression analysis..

14.5 An Analysis of the Relationship Between Attitudes to Drug Use and Monthly use of Alcohol Commencing In Grade 8.

As drinking behaviour increases to monthly use in Grade 8, attitudes to drug use are again fairly constant in their relationship at each successive time point. Once alcohol use becomes established, after Grade 8, strong relationships exist between attitudes to drug use and monthly alcohol use at each succesive time period (Figure 14.3(b)). At the Grade 8 stage of initiation into monthly alcohol use, neither past nor current attitudes are significant predictors of alcohol use. It would appear that regular drinking behaviour established at Grade 8 may also be the result of influences other than attitudes held previously in Grade 7 or held concurrently within Grade 8. Influences such as peer association, involvement in recreational activities, peer pressure, etc, may all have an impact on the development of monthly alcohol use.

The variance explained by the model (Figure 14.3(b)) with regard to monthly alcohol use at Grade 9 is 47%. The variance accounted for by the pathways leading to Grade 9 attitudes to drug use contribute significantly to the establishment of Grade 9 attitudes. It is again quite probable that alcohol use behaviour continues to be influenced by other factors.

At Grade 10 strong relationships between Grade 9 attitudes to drug use and Grade 10 monthly use of alcohol exist. Similarly Grade 10 alcohol use appears significantly influenced by early Grade 9 alcohol use

and current attitudes to drug use. It would appear that as regular drinking behaviour becomes more firmly established (Grades 9 and 10), strong links between alcohol use and attitudes begin to develop. Stable links across all variables may not emerge until much later in the drug use history of some individuals, as a number of negative associations are still very much in evidence between Grades 9 and 10.

14.6 An Analysis of the Relationship Between Attitudes to Drug Use and Monthly Alcohol Use Commencing in Grades 9 and 10.

Alcohol use commencing in Grade 9 is not adequately explained by the path model presented (Figure 14.3(c)) as only 20% of the variance is accounted for by previous or current attitudes to drug use. The linkages to Grade 10 alcohol use are broken completely, which again suggests that factors, other than those presented in the model, play a role in determining monthly levels of alcohol use.

Examination of the path analysis of individuals who commence monthly alcohol in Grade 10 (Figure 14.3(d)), also supports the belief that past and present attitude-behaviour variables are insufficient to completely explain the onset of regular drinking behaviour. Between Grades 7 and 8 significant attitude scale relationships occur with 55% of the variance associated with Grade 8 attitudes to drug use explained by early Grade 7 attitudes to drug use. Between Grades 8 and 9 the magnitude of the standardized beta drops considerably; and early attitudes, whilst still significant, account for only 19% of the variance at Grade 9. Between Grades 9 and 10, attitude to drug use linkages are completely broken. Current attitudes to drug use and monthly alcohol use are significantly associated. However the variances accounted for with regard to attitudes and behaviour in Grade 10 are only 23% and 37% respectively. Once again the variables examined in the path models

(past and current attitudes and drug use behaviour) fail to adequately account for initiation into drug use at the Grade being examined (Grade 10). It is important to note that prior to initiation into drug use (in this case monthly alcohol use) the strength of association between earlier and current attitudes to drug use falls quite considerably as indicated by reductions in path coeffficients (.84, .61, .33). This pattern has also been noted in earlier analyses of tobacco and marijuana.

The difference in actual mean scale scores obtained for the attitudes to drug use scale highlights the changing nature of attitude and alcohol use relationships. Table 14.1 permits comparison of mean attitude scale scores for individuals who commence monthly alcohol use in Grades 8, 9 and 10. Non drinkers mean attitude scale scores are between seven and eight points lower than that of their drinking counterparts at each grade where initiations into increased use of alcohol commences. Clear rises in attitude scale means occur at the point when alcohol use begins. The final attitude scale levels achieved by individuals who begin using alcohol more regularly at an early age is also higher than that of non users or later users (eg., Grade 10).

14.7 Summary and Conclusion

The analyses presented in this chapter examine the strength of association that exists between attitudes to drug use and drug use behaviour. Causality has not been demonstrated. Because of the number of analyses conducted and the relatively small number of subjects included in these analyses, considerable caution needs to be exercised regarding the level of interpretation that is sustainable from the data. Although each set of analyses has been examined separately, it is only appropriate to comment, in this concluding section, on general

trends that have appeared with some degree of consistency across the complete set of analyses.

Strong relationships appear to exist between attitudes to drug use held at each particular grade with attitudes held at the preceding grade. Table 14.2 documents the strength of the association between each successive grade. Table 14.2 also presents grade by grade comparisons of drug use correlations which further suggest strong relationships between immediate past drug use behaviour and current drug use behaviour.

Table 14.2 Correlation Between Attitudes to Drug Use and Drug Use in Successive Grades and also Between the Use of Tobacco, Marijuana and Alcohol in Successive Grades for the Longitudinal Sample (N=239)

Grade to Grade Comparisons	Attitudes to Drug Use	Tobacco Use	Marijuana Use	Alcohol Use
	r*	r	r	r
Grade 7-8	.78	.71	.49	.47
Grade 8-9	.72	.80	.38	.67
Grade 9-10	.68	.83	.34	.63

* All Pearson 'r' coefficients presented throughout this table are significant at <.001 level

As age increases, the contribution made by earlier attitudes to drug use on attitudes to drug use held at a later grade appear to fade. As the strength of the association fades the error term becomes larger indicating a rise in unexplained variance. The Pearson correlational data (Table 14.2) also supports this trend, as the Grade 7 to 8 coefficient for attitudes is a high .78 dropping at Grade 8 to 9 to .72 and at grade 9 to 10 to .68. A corresponding increase occurs, however, with regard to the magnitude of path coefficients linking early alcohol use and tobacco use

behaviour to later alcohol and tobacco use. As age increases the amount of explained variance goes up. The Pearson r coefficients for tobacco use behaviour, for example, increase from .71 between Grades 7 and 8, and to .80 between Grades 8 and 9, and finally to .83 and between Grades 9 and 10. Similar increases also occur with regard to alcohol use. As attitudes supporting non use of drugs or minimal use begin to fade alcohol and tobacco use behaviour appears to become more established and less dependent on attitudes. The relationship between marijuana use and attitudes to drug use is not as clear cut.

The overall impression obtained from analysis of marijuana use data is the general limitation of an attitude-behaviour model to adequately account for initiation into use. In almost all analyses factors not included in the model appeared to play a major part in the decision to commence and continue marijuana use. One very clear finding with regard to marijuana use, however, is that marijuana users appear to hold very high pro-drug use attitudes (Table 14.1). They may be at more risk for ongoing drug use than individuals who hold lower overall attitude to drug use scores. This situation may also be true for individuals who begin using drugs much earlier than their peers as their attitude scale scores become established at an elevated pro-drug use level at a time when a lack of maturity may be a decided disadvantage.

Attitudes do seem to be important determinants of drug use behaviour and it would appear that as the magnitudes of standardized betas drop, drug use either begins or increases in intensity. Although there are exceptions to this finding at certain grade levels the impression gained from an analysis of the overall picture regarding attitude-behaviour relations supports the belief that it is important to stabilise attitudes in order to prevent a slide towards drug use.

The focus of the analyses conducted has been on the relationship between prior and current attitudes and the possible prediction of subsequent drug use behaviour. Although it is clear that a strong association exists between attitudes and behaviour, it is important to recognise that these variables exist in a stream of time that is more extensive than the once yearly level of measurement utilized here. It is also important to recognise that variables such as peer pressure, peer association, sporting links, etc, may have a significant impact on drug use behaviour during each of the grades at high school. On a number of occasions the available attitudes to drug use and past drug use behaviour linkages included in the model have failed to account for the major portion of the variance in drug use. This suggests that although in general the model examined fits the data well, a number of influential variables not included in the analysis may be particularly significant prior to and during the onset of drug use. Not withstanding this conclusion, it appears that attitudes to drug use do play a pervasive and important role in the development and maintenance of both drug use behaviour and abstinence from drug use. It is therefore important for drug educators to be aware of the importance of these relationships and to support the development of attitudes that oppose harmful drug use behaviour.

Each of the analyses conducted in this chapter and in earlier results chapters have provided a fairly detailed and comprehensive picture examining both the effects of the intervention program on drug use, and the nature of relationships between drug use and a number of different variables. The next and final chapter moves from the specific details of each set of analyses towards an overview of the research

findings and their relevance to the underlying conceptual framework of drug education tested in this research.

Chapter Fifteen : Conclusions and Summary: An Evaluation of The Psychosocial Developmental Influences Model of Drug Education.

In Australia during the last decade there has been a substantial quantity of resources directed towards drug education; and, since 1985 with the launching of the National Campaign Against Drug Abuse, a significant upsurge in activity has occurred. It is important to ask if this increased activity is based upon a clearer philosophy and understanding of adolescent drug use and the principles of successful drug education than was previously the case. The major aim of this research has been to develop a drug education program based on a clearly articulated theoretical framework, which, if tested empirically, can provide understanding of the relevance of the theoretical basis of the model.

The purpose of this final chapter is to examine the success or failure of the model of drug education developed in this study, and to relate these findings to the concepts and research reported in earlier chapters. This chapter also examines the adequacy of the research methodology used in this study and the extent to which it permits comment to be made on the further development of the model and its relevance to an emerging literature concerned with drug education theory. Some of the more recent research, undertaken after this study was planned and initiated, offers additional insight into the results and their implications. This chapter draws together the findings of this research and offers interpretation of the findings against a backdrop of relevant recent research and theoretical development.

Theoretical developments, according to Baer, McLaughlin, Burnside & Pokorny (1988) are of value, not only because they serve to make adolescent substance use comprehensible, but also equally importantly because they provide the basis for the formulation of preventive interventions. Earlier drug education endeavours were often atheoretical or where theories were developed insufficient empirical evidence was available upon which to base an assessment of the success or failure of the program. Many programs were accused of being rather precariously balanced on disparate and often incoherent views regarding the causes of drug use and the development of a carefully developed and articulated concepetual framework (Moskowitz, 1989; Wheller, 1990; & Wragg, 1990, 1991).

15.1 A Drug Education Based on the Psychosocial Developmental Influences Model can Be Effective in School Settings

The final model of intervention outlined and developed in the early chapters integrated a number of key aetiological factors, developmental considerations and educational principles into one conceptual framework. In order to test the effectiveness of the intervention program to change drug use behaviour, a number of outcome indicators were identified in the form of a series of hypotheses. The major results of this research, presented in the preceding chapters, indicate that a number of statistically significant differences between intervention and non-intervention subjects have been reported. These differences suggest that the intervention program has been able to change drug use behaviour and attitudes to drug use. The support for the program must be both qualified and carefully defined in relation to limitations imposed by the nature of

the research methodology. The results of the study do suggest that school based interventions, based on a psychosocial developmental influences model, can alter attitudes and subsequent drug use behaviour.

In comparison to a non-intervention control group, intervention group subjects have shown reduced levels of use for three of the major drugs used in adolescence, (alcohol, tobacco and marijuana). Program participants also held attitudes that, in comparison to non-intervention group subjects, showed greater opposition to pro-drug use beliefs and to the use of substances that were considered health threatening. The study has also shown that attitudes to drug use and drug use behaviour changes can be maintained for several years. In comparison to non-intervention group subjects the intervention group reported a reduced incidence of illegal drug use, particularly with regard to the use of marijuana. Intervention subjects also indicated significantly greater ability to resist the urgings of peers to use drugs and, in comparison to non-intervention group subjects, a delayed age of experimentation of drug use onset was recorded for both tobacco and marijuana use. In summary, this study has shown that as a result of a school-based intervention based on a psychosocial developmental influences model, significant changes to both legal and illegal drug use and attitudes to drug use can take place; but even more important is the fact that such changes have proved to be durable.

The intervention program appears to be least successful in changing self medication practices with regard to analgesic use. Analgesics are generally regarded as quite acceptable and socially

approved substances in Australian society and, in consequence, intervention messages which suggested different remedies for headaches or other pains, were generally disregarded. It also needs to be noted that saturation point with regard to analgesic use had already occurred prior to the intervention program and although there were moderate changes in self reported medication in Grade 7, these changes were quickly lost in Grade 8, and beyond, as the program effects faded. A comparison of intervention and non-intervention groups choice to use or not use alcohol also failed to reach significance. Because alcohol, like analgesics, is also regarded as a socially accepted and approved of substance in Australia, it was hardly surprising that the incidence of use did not show differences. The other major categories of alcohol use including frequency, amount consumed and subsequently derived effects were significantly reduced for the intervention group when compared with the non-intervention group. The major test of the intervention program's effect is, in all probability, more appropriately applied to the manner in which alcohol was used. Significant program effects were observed for this drug. It also needs to be noted that in all other drug categories clear differences existed between intervention and non-intervention group subjects, in relation to the incidence of use as well as the amount and frequency of drug use.

Although there is some evidence to suggest that program effects fade during later grades, it is important, as indicated earlier, to note the overall strength and durability of intervention across the entire four years of follow-up. There are a number of possible reasons for this that can be linked to the theory base of the program, but before moving to a discussion of the theoretical framework and the

implications for drug education it is important to focus on a number of methodological issues regarding this reserach.

15.2 A Methodological Evaluation

Any conclusions drawn from a quasi-experimental study within a field setting, in which subjects are surveyed a number of times across a four year follow up, demands cautious interpretation and generalisation. The problem of significant subject attrition at follow-up is an important constraint in longitudinal studies. This study has, for good conceptual and practical reasons, attempted to collect data on subjects over approximately four years, but this time span exacerbates the problem of attrition. If information loss, due to reduced sample size, is too great, and if the proportion of subjects lost to the study varies significantly between intervention and non-intervention groups, then external validity may be threatened. The question of external validity is, in essence, a question of generalization. Although the research has taken place in a natural setting, it is important to address the extent to which these findings can be applied to other populations and other settings.

A number of factors can be identified which lessen the possible impact of attrition. For the longitudinal sample (subjects whose data were complete across all collection points) attrition over four years was approximately 60%. Data were also analysed for all students who were present at each grade; and this group represents a much larger proportion of the 619 original subjects. The averaged attrition rate across the four years of the study for this group was only 30%. Because analysis of both groups was conducted, and their results

compared, it is possible to argue that loss of information due to attrition has been minimised. It is also important to note that the proportion of subjects lost to both intervention and non-intervention groups was essentially the same; and therefore loss of information due to attrition did not favour either group. In addition, a comparison of baseline drug taking behaviour and attitudes to drug use at the time of major attrition in Grade 7, indicated no significant differences between subjects who were lost to the study and those subjects who remained. After Grade 7 attrition rates were reduced and, although information loss has been minimised it is still important to recognise the constraints placed on this study due to a loss of information.

A number of other factors must also be considered in relation to limiting the possible range of generalisation from this evaluation. The small sample size is a limiting factor, although when the larger cross-sectional sample numbers are examined this consideration is to some extent reduced. The study was conducted with a total of seven primary schools feeding into just two high schools and this could also be considered a limiting factor. Although the primary school was used as the unit of assignment to the intervention or non-intervention condition, the student was used as the unit of analysis because the number of high schools was too small to permit analysis on a school basis. Where subject by subject analysis, comparing differences in overall effects between groups of subjects is used within each high school, some researchers suggest that there can be increased liklihood of a type 1 error (Botvin, Dusenbury, Baker, James-Oritz, & Kerner 1989; Barcikowski, 1981). It is usually argued that an over estimation of effect size could occur possibly because all subjects who have experienced an intervention will interact almost exclusively with only

those individuals who have been involved in the drug prevention program. In similar fashion,non intervention group subjects will, in general,have only been exposed to viewpoints expressed by young people, who themselves have not been involved in a drug prevention program. Both high schools used in this research included a mixture of intervention and non-intervention subjects. It is unlikely, therefore, that school and intervention effects would be confounded, although such a consideration cannot be ruled out.

The problem of relying on self report data without the use of external validation measures to confirm the accuracy of these reports may still require further consideration. Studies that use other procedures, such as laboratory analysis of saliva to identify tobacco use, may still improve the accuracy, consistency and completeness of student responses. A recent research report (Reinisch, Bell & Ellickson, 1991) indicated that more than 40% of students committed at least one longitudinal inconsistency across four waves of data collection. These inconsistencies were regarded by the researchers as minor and were classified as either inconsistent reporting of infrequent use or inaccurate recollection of limited use during a twelve month period. Inconsistencies classified as severe (e.g. denying frequent use) involved less than 2% of the students. The same research study indicates that approximately 5% of students provided incomplete or inconsistent responses. Laboratory analyses examining recent cigarette use was 95% correct in relation to self-reports. The conlusion reached by these researchers was that reporting errors did not threaten the validity of treatment effects analysis. However, their results were analysed after a 15 month follow up period, whereas the data conducted by this study spanned a four year period. During such

a lengthy follow up a number of threats to reliability and validity have been present, and, although they have minimised, it is important to recognise the problems that longitidinal studies encounter. Because of the existence of such problems it would be unwise to generalize these findings to a wider setting or population without acknowledging the limitations imposed by small sample size, semi-random assignment of subjects and some loss of information due to attrition.

Whilst the methodological discussion previously outlined suggests a note of considerable caution needs to be acknowledged regarding the meaning of the findings, the results do permit comment to be made on a number of issues regarding the model of drug education developed in this current research.

15.3 Implications For Drug Education Programs Arising From The Links Between Attitudes to Drug Use and Progression into Drug Using Behaviour.

The current research findings point to the fact that after intervention, pro-drug use attitudes drop significantly in comparison to those held by non-intervention group subjects, and throughout the study this difference remains statistically significant. Lower scores on the attitude to drug use scale, used in this research, are associated with significantly reduced levels of drug use. It would appear that attitudes which oppose drug use and support a pro-healthy, moderate or minimal approach to the use of various drugs are important mediators of drug use behaviour. There are, of course, many factors which may have an impact on the development and maintenance of attitudes that oppose drug use. This research does not attempt to identify and estimate all of the various influences, or multiple pathways to drug use behaviour, that arise from a consideration of a

range of social and psychological factors. The findings from this research do suggest that it is important for drug educators to focus on the development of attitudes and beliefs that oppose pro-drug use behaviour.

The focus of the intervention program on the use of developmentally appropriate drugs, such as alcohol and tobacco, rather than on many of the more exotic and illegal drugs such as L.S.D., amphetamines and opiates, appears to be beneficial. Because substances such as alcohol and tobacco can be regarded as gateway drugs, it was anticipated that reduced levels of usage in the legal area would reduce progression along a drug use continuum towards illegal drug use. This appears to have been the case. Marijuana use levels are significantly different between intervention and non-intervention group subjects. Although usage of other illegal substances may just be beginning, and data on both groups are fairly limited, there are indications that less progression towards illegal drug use has also occurred.

The level of progression of intervention group subjects along a developmental continuum of drug use is significantly less than that of non-intervention group subjects. This reduced progression may also be linked to a delayed age of drug use onset. Although the age of onset for alcohol use and analgesic use was not greatly different between the two groups, there were significant intervention and non-intervention group differences with regard to tobacco and marijuana use. Tobacco, in particular, appears to be a drug that may well act as a gateway, or entry point, for drug use further along the developmental continuum.

15.4 The Importance of Teaching Peer Resistance Skills.

The psychosocial developmental influences model, that has been tested in this research, argues that peer influence, in the lives of adolescents is inevitable. As young people progress into adolescence the process of maturation causes physical, cognitive and social change. Due to the development of adolescent egocentric thinking and a desire to establish a new more mature adult identity, apart from the family, the adolescent seeks out the peer group and tries to gain recognition and approval from this new reference group. From a psychosocial developmental viewpoint, the importance of providing adolescents with effective decision making skills and building resistance to peer pressure is paramount, because initiation into drug use almost always occurs within a peer context. One of the main determinants of drug use behaviour, particularly with regard to early or delayed onset of drug taking, may well be linked, therefore, to the ability to resist peer pressure to use certain drugs and to stick to that decision.

The results of this research indicate that in the early grades (7 and 8) significant differences with regard to the ability to resist peer group pressure to use drugs existed between the two groups. Intervention group subjects indicated that, in comparison to non-intervention group subjects, they possessed greater ability to resist peer influence to either use certain substances or to increase levels of use. This finding may well explain why a delayed age of drug use onset occurs. When considered together, these factors would almost certainly be expected to impinge on the level of progression along a developmental scale of drug use.

The initial ability to refuse offers of drugs and to uphold such decisions may also infer some level of ongoing protection to individuals in later grades. No significant differences between the two groups are, in fact, reported in Grades 9 and 10 concerning the ability to resist peer pressure. There is, however, a problem with the way the question regarding peer pressure and its influence on drug taking behaviour was phrased. Subjects do not indicate how often they have actually been pressured, and it is therefore difficult to know if falling significance levels to this question occur because individuals stop being subjected to pressure (once they have demonstrated an ability to stick to decisions), or alternatively no significant difference now exists between the groups.

It is important at the program level to note that the power of the program appears to fade after Grade 8 with regard to the ability to resist peer pressure. This tends to reflect a trend towards reduced significance levels in subsequent drug use behaviour comparisons. Grade 9 may well be an important stage in adolescent development with regard to the possible reworking of earlier decisions. The implication arising from such a conclusion is that early education programs, which begin prior to adolescence, may need a significant stage at the end of Grade 8 or very early in Grade 9. The development of a booster stage could either delay or prevent an increase in drug use, or a reworking of previously held anti-drug use attitudes and beliefs from occurring. It is important to note that the 'booster' section of the current program occurred mainly in Grade 7 with the return to primary school of last year's program participants. In Grade 8 no follow-up occurred. Program effects appeared to fade in the

second year after the last significant contact (i.e., in Grade 9) was made. Another possible implication arising from this conclusion may be the need to develop a program that has ongoing progression and continuity over several years, rather than merely adopting a 'booster' stage in Grade 8 or Grade 9.

15.5 The Adequacy of the Psychosocial Developmental Influences Model of Drug Education: Implications for Further Theoretical Development.

The intervention effects demonstrated in this study provide evidence for the efficacy of a social influences prevention model. This finding appears consistent with results from other studies conducted in the mid to late 1980's. At the time when this research was conceptualised (1982) and implemented (1983 and 1984) research evidence was still sparse regarding precisely what kind of school-based program could be effective. In Australia in 1982-83 the precise nature of what constituted an effective drug education program remained unresolved and evidence based on longitudinal follow-up was almost non-existent.

In the mid 80's evidence to suggest that social influence programs were yielding positive results had begun to appear (Botvin, Baker, Renick, Filazzola and Botvin, 1984; Ellickson, 1984a; Flay et al, 1985; Glynn et al, 1983). The primary theoretical rationale for these programs came from an analysis of the causes of drug use; and in particular the causes of adolescent tobacco use. Further theoretical development drew upon social learning theory (Bandura 1977) and psychological innoculation and persuasive communication theories (McGuire, 1964, 1968). These developments led to the construction of programs that emphasised the teaching of assertiveness skills. They

also combined role play techniques, psychological innoculation approaches and modification of attitudes into skill based interventions designed to combat peer influences to smoke tobacco or use other drugs.

Smoking prevention programs based on these social influences models demonstrated up to 50% reductions in the rate of onset of smoking (eg, Flay et al, 1985; Schinke et al, 1985, 1986). By the late 1980's considerable evidence had begun to accumulate to suggest that social influence programs could be quite effective (Biglan et al, 1987; Ellickson & Bell, 1990; Flay, 1985; Glynn, 1988; Perry et al., 1987; Schinke et al., 1985; Seversen & Lichenstein, 1986). It needs to be noted, however, that the majority of successful social influence studies have been concerned with tobacco use within a context of rising public disapproval of cigarette smoking. Ary et al (1990) comments that the efficacy of social influence programs for deterring drugs other than tobacco is, as yet, not well established. That this intervention appears to have had a significant impact on alcohol and marijuana use, as well as tobacco use, is an important research finding. It is also important to recognise that the present study also contributes to the drug education research literature by providing some evidence that a psychosocial developmental-influences model has been effective in Australia.

It is necessary to examine both the extent of the supporting evidence, and the significance of these findings within the context of the underlying theoretical model on which the program has been based. Despite the hundreds of studies carried out in the last fifteen or so years, only a handful of studies have been able to demonstrate

the effectiveness of substance abuse education. Bangert-Drowns (1988) in his meta-analysis on the effects of school-based drug education, comments that much more still needs to be known about the effectiveness of substance abuse education. Bangert Drowns found only thirty three evaluations reported during the last fifteen years met the standards set for rigorous and comprehensive reporting of program content, mode of delivery and outcome measures (only fourteen in fact measured drug use). He concluded that "substance abuse education has, for the most part, failed to achieve its primary goal, the prevention of drug and alcohol abuse" (p260). In both Tobler's (1986) and Bangert Drowns' (1988) meta-analyses, education has been effective in increasing drug related knowledge whilst attitudes to drug use appear to be more resistant to change and substance use has remained essentially unchanged, except in a handful of studies.

The findings of the present investigation are of importance, because they add impetus to a sparse, but developing body of literature that supports the efficiacy of psychosocial drug education programs. Other models of drug education have been considerably less successful in changing drug use. These earlier models assumed that young people either lacked understanding of the effects and consequences of drug use (information model), or that young people lacked self esteem, communication and decision making skills (personal skills deficit model). Programs using either of these two models were largely unsuccessful in altering drug use behaviour. The model developed in this research has, in contrast to both the information and skills deficit models, yielded encouraging results in

preventing drug use behaviour that could be considered to be harmful to health.

That the model of drug education tested by this research has produced discernible changes in attitudes to drug use and drug use behaviour is in itself an important finding. The results of this study appear to support a psychosocial developmental influences account of adolescent drug use. The model of drug education tested by this research combines a number of perspectives and theoretical viewpoints into one framework. At this stage, in the development of models of drug education, it is not possible to examine each separate program element in order to establish the amount of variance that each contributes to the overall effect. Nevertheless, it is possible to identify a number of important theoretical considerations that appear to play a significant role in determining the extent of adolescent drug use.

Initiation into substance use is primarily seen as an adolescent phenomenon that occurs within the context of an expanding psychological, social and developmental framework. From this perspective drug use is a purposeful and socially learned behaviour which can be influenced by peer and family beliefs and behaviour. Changes in the developing adolescent are viewed within a context of influence that arises from a range of psychosocial factors. Maturational forces create a predisposition towards initiation and progression into substance use. This predisposition can be minimised or increased by a range of psychosocial factors, chief amongst which are peer association and peer pressure, and a social context in which

alcohol and other drugs are regarded as generally available and widely used.

The implications arising from this theoretical formulation have been integrated with a number of health education and communications theory principles, such as persuasive communications theory, psychological innoculations theory and the theory of reasoned action. These theories emphasise the importance of peers and significant adults as credible communicators. They recognise also the importance of the adolescents' perception of normative social behaviour that may need to be challenged, or reinforced, depending on the beliefs held regarding appropriate drug use behaviour.

The model of drug education developed by this research has integrated a number of perspectives and theoretical viewpoints into a framework that has been used to develop a drug education program. The results of this research support the effectiveness of such a model to change drug use behaviour but, at this early stage in the development of testable models of drug education, it is difficult to identify which specific components reduce or increase the impact of the program. It may well be that programs combining many theoretical considerations are merely a reflection of the fact that adolescent drug use is a complex phenomena. Until further refinements and re-evaluations of the model occur, it may not be possible to determine which program components are of most value. The findings of the present investigation have, in one instance generated sufficient data to seriously question the value of including one particular program component.

The results of this research suggest that a naive interpretation of an 'alternatives to drug use' theory was totally inadequate. One of the earliest solutions proposed to the problem of drug use was the provision of suitable alternatives. Alternatives such as hobbies and sports were often cited as activities that young people should be encouraged to participate in. It was assumed that these activities would prevent drug use from occurring. Meta-analyses by Schaps, et al(1981) and Tobler(1986) indicated that, in general, the provision of alternatives programs had been effective. What remained as unclear was the precise definition of exactly which alternatives should be proposed, and which particular drugs would be effected.

The results of this research has indicated that participation in some sports may be linked to reduced drug use, whilst other sports may be tied to levels of increased usage. Further exploration of the links between drug use and recreational pursuits with both an adult and adolescent population need to be conducted in order to build up a more substantial and coherent picture than is currently available from this research. In Australian society a range of sporting events attract a huge following and also receive considerable media attention. Many of these sports are linked to sponsorships from alcohol and tobacco companies, and advertising and television exposure of these links occurs (Powell, 1991). If health behaviour can be shaped and influenced by 'heroes' and role models from a range of sports such as rugby league, cricket, motor and motor cycle racing, then many young people are continually being exposed to images of well known sports personalities associated with tobacco and alcohol products.

If some sports are indeed linked to increased levels of drug use then measures may need to be adopted to minimise the risk to young people. Sports such as rugby football and surfing appear to be linked to higher levels of legal and illegal drug use whilst other sports such as jogging or tennis may well be associated with reduced levels of drug use. It is, of course, important to acknowledge that a third or hidden variable may be causally responsible for each of these findings and it is quite likely that peer association, rather than the sport identified, makes a major contribution to increased or decreased drug use. Nevertheless, the implications arising from the data analysed in this study suggest that a serious re-examination of the alternatives theory may be required.

15.6 The Need for Further Research Based on a Psychosocial Developmental Influences Model

Further research is needed to determine which particular elements within the aetiological framework and implementation structure underpinning the psychosocial developmental influences model provide the most useful and economical combination of program elements. Because the small sample size limits the degree to which these results may be generalised to a wider population it may be necessary to re-examine the psychosocial developmental influences model of drug education with a larger and more representative population before attempting to identify how particular elements contribute to the overall effect size.

Notwithstanding this comment it would appear that sufficient evidence has been generated to support the inclusion of a number of key program elements. Acceptance of minimal and responsible drug

use beliefs or attitudes appears to be an important factor that influences drug use behaviour. Students who accept non-drug use or minimal drug use norms are likely to both associate with, and, in all probability, choose friends with similar non-drug use beliefs. The establishment and development of attitudes that oppose drug use behaviour, which can be regarded as health threatening, may well be an important factor that prevents, or at least delays subsequent drug use behaviour. The findings of the present study also suggest that the focus on resisting peer pressure to use drugs whilst utilising positive peer and parent involvement in the program should be continued. Peers and parents can act as credible communicators and sources of information. They can also influence the development of local norms regarding the judicious and appropriate use of drugs within a community. The converse is also true, and for this reason intervention programs need to provide adolescents with decision making and assertiveness skills, in order that they are able to reject pro-drug use messages in social situations where drug use is being promoted.

This research has achieved its aims in permitting an evaluation of a drug education program based on a theoretical framework to be conducted. The results of the present investigation do suggest that school based programs based on a psychosocial developmental influences model have the potential to decrease substance use in adolescence. The psychosocial developmental influences model has in general adopted principles derived from persuasive communications and psychological innoculations theory as well as the theory of reasoned action. In the current research, these perspectives have been integrated within a social learning theory framework in which positive peer pressure has been utilised and negative peer pressure opposed.

Ellickson and Bell (1990) conclude their investigation of a similar social influence model of prevention by pointing to the benefits that can accrue by decreasing substance use among young people. I shall conclude this thesis with a quotation from their study:

> "Such a decrease has positive implications for adolescent development and safety and for public health in general. Marijuana use can impair memory, distort pereception, and diminish motor skills, thereby interfering with the young person's ability to learn and increasing the likelihood of driving and other accidents. The earlier people begin to smoke, the harder it is to stop and the greater the risk of illness related to tobacco use. Moreover, drug use initiation before age 15 increases the risk of dysfunctional use or abuse in later years, whereas curbing cigarette and marijuana use, particularly the latter, offers the prospect of preventing or delaying progression to other dangerous drugs. Thus, each year that adolescent use of these gateway substances can be delayed or reduced represents an important gain" (p.6).

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Appendix One

Standard Format for Introducing Comments to be used by All Administrators Conducting the Drug Use Survey.

Good morning/afternoon. My name is ..... and I am conducting a survey that can assist researchers at the University of Wollongong to gather information and opinions about drugs and drug use. The purpose of this survey is to discover exactly what kind of drug use experiences young people have had. Its purpose is also to learn what young people think about the use of drugs.

This booklet contains questions which ask about your background and about the use of drugs. The questions about you and your family - for example, how old are you, what your parents do for a living are needed by the researchers so they can compare answers by different groups. The questions about drugs ask about alcohol drinks (beer, wine and spirits); smoking tobacco either as cigarettes, rollies, or cigars and taking headache tablets or powders such as aspirin, codeine, panadol, bex, or vincents and a number of other drugs.

This is not a test. There are no right and wrong answers. We do ask, however, that you try to answer each question as truthfully as possible. Your answers will be completely confidential and anonymous. We are not interested at all in individual answers but only at looking at the kind of habits and ideas regarding drugs and alcohol that people of different ages hold. Your answers will not be traced back to you. You don't even write your name on the questionnaire and not even the overall results for this school will be reported separateley.

We are not interested in your name so please do not write it anywhere but we do wish to be able to compare how young people behave at different times so we want to be able to tie your repsonses at this time to other ones (taken before or after the current collection point) so we ask you to make sure you fill in the answers to all the questions.

Please be as honest and truthful as you can and remember we are not interested in who you are so the information is completely private and confidential and will not be traced back to you but treated as a pool of information that tells us about how (age of students - eg. 15-15 year olds) think.

WILL YOU LOOK AT THE FIRST PAGE OF THE BOOKLET NOW

Read the instructions carefully and try the examples on the first page.

Allow time for them to read and complete the examples then go through the examples and ask if there are any questions. Draw particular attention to the difference between example B, last four weeks, and example C, last week and to the need to report for the whole of the week and not just one average day in example D.

Instruct the students to complete the questionnaire and remind them that they shouild try and answer every question. Ask the, when completed to drop the questionnaire to the large cardboard box at the door and to leave the room.

QUESTIONNAIRE

Please read the instructions

INSTRUCTIONS

These practice questions below are the same types of questions in the survey booklet. For almost all of the them you will be asked to **PUT A CIRCLE AROUND THE NUMBER NEXT TO THE ANSWER THAT IS RIGHT FOR YOU.**

A. Have you ever eaten ice cream?

Yes 1
No 2

B. On how many days did you eat ice cream in the last four weeks?

None 1
On 1-2 days 2
On 3-5 days 3
On 6-9 days 4
On 12-19 days 5
On 20 or more days 6
Every day 7

C. On how many days did you eat ice cream in the last week?

None 1
On 1-2 days 2
On 3-4 days 3
On 5-6 days 4
Every day 5

D. How many ice creams have you eaten in the whole of the last week?

None 1
1-2 2
3-4 3
5-11 4
12-27 5
28 or more 6

Please turn over and begin when you have finished this page.

SECTION 1

1. What year are you in at school? (Please circle one number)

   Year 7 1
   Year 8 2
   Year 9 3
   Year 10 4
   Year 11 5

2. What age did you turn on your last birthday?

   10 years 1
   11 years 2
   12 years 3
   13 years 4
   14 years 5
   15 years 6
   16 years 7
   17 years 8
   18 years 9

   What is your date of birth? .....

3. What sex are you?

   Male 1
   Female 2

4. Who lives in your home with you?

   Your father (or stepfather) 1
   Your mother (or stepmother) 2
   Your brother (or brothers) 3
   Your sister (or sisters) 4
   Your grandparents 5
   Somebody else 6

5. What job does your father (or stepfather) do? (Please do not just say 'he works at Coles'. **WRITE DOWN** what his job is exactly, e.g. 'Sales Manager at Coles'.

   .....

6. What job does your mother (or stepmother) do? (Write it down)

   .....

7. Have you ever had an alcoholic drink?

Yes 1
No 2

If you answered NO (2) to this question go straight to question 14.

8. How old were you when you had your first alcoholic drink?

Under age of 7 1
7 or 8 years old 2
9 or 10 years old 3
11 or 12 years old 4
13 or 14 years old 5
15 or 16 years old 6
17 or 18 years old 7
Over 18 years 8

9. Have you had an alcoholic drink in the last twelve months?

Yes 1
No 2

If you answered NO (2) to this question go straight to question 14.

10. On how many days did you have an alcoholic drink in the last four weeks?

None 1
On 1-2 days 2
On 3-5 days 3
On 6-9 days 4
On 10-19 days 5
On 20 or more days 6
Every day 7

11. On how many days did you have an alcoholic drink in the last week?

None 1
On 1-2 days 2
On 3-4 days 3
On 5-6 days 4
Every day 5

12. On a day when you have an alcoholic drink, how many drinks would you usually have?

A few sips or mouthfuls 1
1 or 2 drinks 2
3 or 4 drinks 3
5 or 8 drinks 4
9 or 12 drinks 5
Over 12 drinks 6

13. On a day when you have had an alcoholic drink, what kind of effects would it normally have had?

No effects 1
Feel hardly any effects 2
Slightly drunk/Tipsy 3
A fair bit drunk 4
Very drunk 5
Passed out 6

The next few questions are about smoking tobacco in cigarettes, rollies or pre-packed.

14. Have you ever smoked tobacco?

Yes 1
No 2

If you answered NO (2) to this question go straight to question 20.

15. Have you ever smoked tobacco in the last twelve months?

Yes 1
No 2

If you answered NO (2) to this question go straight to question 20.

16. How old were you when you first smoked tobacco?

Under age of 7 1
7 or 8 years old 2
9 or 10 years old 3
11 or 12 years old 4
13 or 14 years old 5
15 or 16 years old 6
17 or 18 years old 7
Over 18 years old 8

17. On how many days have you smoked tobacco in the last four weeks?

None 1
On 1-2 days 2
On 3-5 days 3
On 6-9 days 4
On 10-19 days 5
On 20 or more days 6
Every day 7

18. On how many days have you smoked tobacco in the last week?

None 1
On 1-2 days 2
On 3-4 days 3
On 5-6 days 4
Every day 5

19. On a day when you smoke cigarettes how many would you usually smoke?

A few puffs 1
1-5 a day 2
Approximately $\frac{1}{2}$ a packet a day 3
Approximately $\frac{3}{4}$ a packet a day 4
Approximately 1 packet a day 5
More than one packet a day 6

20. What brand or brands do you usually smoke?

.....

The next few questions are about pain relievers (i.e. headache tablets, powders like Aspirin, Vincents, Bex, Panadol, Disprin etc.). (Please circle a number for each question.)

21. Have you ever taken pain relievers?

Yes 1
No 2

If you answered NO (2) to this question go straight to question 25.

22. Have you ever taken pain relievers in the last few months?

Yes 1
No 2

If you answered NO (2) to this question go straight to question 20.

23. On how many days have you taken pain relievers in the last four weeks?

None 1
On 1-2 days 2
On 3-5 days 3
On 6-9 days 4
On 10-19 days 5
On 20 or more days 6
Every day 7

24. How many pain relievers, tablets or powders have you taken in the whole of last week?

None 1
1 or 2 2
3-6 3
7-13 4
14-27 5
28 or more 6

The next few questions are about marijuana (grass, pot, joint, cannabis or hashish - hash, hash oil).
(Please circle a number for each question.)

25. How many times have you used marijuana or hash in your life?

Never used 1
1 or 2 times 2
3-5 times 3
6-9 times 4
10-19 times 5
20-39 times 6
40 or more times 7

If you answered NEVER USED (1) go straight to question 29.

26. How many times have you used marijuana or hash in the past twelve months?

Never used 1
1 or 2 times 2
3-5 times 3
6-9 times 4
10-19 times 5
20-39 times 6
40 or more times 7

27. How many times have you used marijuana or hash in the last month?

1 or 2 times 1
3-5 times 2
6-9 times 3
10-19 times 4
20-39 times 5
40 or more times 6

28. At what age did you begin to use marijuana or hashish?

Under age of 7 1
7 or 8 years old 2
9 or 10 years old 3
11 or 12 years old 4
13 or 14 years old 5
15 or 16 years old 6
17 or 18 years old 7
Over 18 years old 8

The next few questions are about things that are sniffed, e.g. petrol, glue etc. (Please circle a number for each question.)

29. Have you ever sniffed any substances?

Yes 1
No 2

If you answered NO (2) to this question go straight to question 32.

30. How many times have you sniffed substances during the past twelve months?

Never used 1
1 or 2 times 2
3-5 times 3
6-9 times 4
10-19 times 5
20-39 times 6
40 or more times 7

31. How old were you when you first sniffed?

7 or 8 years old 1
9 or 10 years old 2
11 or 12 years old 3
13. or 14 years old 4
15 or 16 years old 5
17 or 18 years old 6
Over 18 years old 7

32. If you have used any of these substances in your life time indicate how often. Circle the number.

Sedatives (sleeping pills, barbiturates, mandrax)	NO	YES	1-2	3-5	6-9	10-19	20-39	40+
Tranquilisers (valium, serapax)	NO	YES	1-2	3-5	6-9	10-19	20-39	40+
Opiates (heroin, narcotics)	NO	YES	1-2	3-5	6-9	10-19	20-39	40+
Hallucinogenics (acid, LSD, magic mushrooms)	NO	YES	1-2	3-5	6-9	10-19	20-39	40+
Any other (please write down the name)	NO	YES	1-2	3-5	6-9	10-19	20-39	40+

SECTION 2

This section asks you questions about beliefs, attitudes and also hobbies and games you may pursue.

1. Do you take part, on a regular basis, in any sports (whether team or individual) in your spare time? Please circle the answer that is correct for you.

YES NO

If your answer is yes, please write down the sports that you have regular involvement with and state how often you participate.

Sports in which you participate	Indicate how often you participate (e.g. every day, twice a week, four times a month, etc.)
*	* .....
*	* .....
*	* .....
*	* .....
*	* .....

2. Do you have any hobbies or pastimes (not sports) that you take part during your spare time? Please circle the answer that is correct for you.

YES NO

If your answer is yes, please write down the hobbies or pastimes that you have regular involvement with and state how often you participate.

Hobbies or pastimes in which you participate	Indicate how often you participate (e.g. every day, twice a week, four times a month, etc.)
*	* .....
*	* .....
*	* .....
*	* .....
*	* .....

3. Sometimes it is possible to get pressured into doing something that you really do not want to do. Please circle the answer that is correct for you with regard to the situations listed below.

Taking an alcoholic drink 1

Drink too much alcohol 2

Taking a cigarette 3

Using marijuana 4

Using another drug 5

Driving while a little drunk 6

4. If you have a headache or other worries what would you normally do? Circle the answer that is correct for you.

Take some kind of medication 1

Rest or relax 2

Let nature take its course 3

Have an alcoholic drink 4

Do something else 5

Please circle the answer that is correct for you. There is no right or wrong answer in these questions. We only wish to find out what you believe is right.

1. There is no need to be concerned about the legal use of tobacco, alcohol, or tablets.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

2. I feel O.K. about getting drunk as long as I was not going to drive.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

3. People who smoke a packet of cigarettes each day are drug addicts.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

4. Marijuana does not do any harm to people who smoke it.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

5. Playing tennis, netball or doing things like pottery, sketching or painting have nothing to do with stopping people from getting involved with drugs.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

6. If some really good friends who had been drinking offered me a lift home in their car I'd take a chance and go with them rather than offend them.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

7. Advertising alcohol or cigarettes in papers or T.V. should be banned.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

8. If all my friends start smoking then I guess I would smoke when I was with them just to be sociable.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

9. If you have a headache or are very tense or worried the most sensible way of coping is to take a headache tablet or some pills from the chemist or doctor.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

10. No matter how careful I think I can drive after I've had a few to drink I still wouldn't risk driving home.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

11. Involvement in lots of hobbies and pastimes can stop young people from getting involved with drugs.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

12. I will probably start smoking when I'm older.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

13. I'd rather not let my friends down or let them think I was a piker so I'd keep on drinking with them even though I'd had enough.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

14. Marijuana is a health hazard and people who keep smoking it are affecting their health.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

15. If you are fed up and everything is getting too much you should go to the doctor and get some tablets to make you feel better.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

16. Smoking cigarettes is a dirty and unhealthy habit.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

17. It's O.K. to drive when you've been drinking as long as you are really careful.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

18. If your friends want you to try some pills with them I reckon I'd give it a go just once.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

19. It's O.K. to drive if you've been drinking as long as you keep off the main roads.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

20. No matter what the circumstances, getting drunk is a stupid thing to do even though lots of adults and young people may do it quite often.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

YEAR 6 QUESTIONNAIRE

Please circle the answer that is correct for you. There is no right or wrong answer, we only want to know what children aged 11-12 years believe and what kind of habits of drinking and smoking are common to Australian children.

1. What is your age now? .....
2. What sex are you? .....
3. What is your date of birth? .....

1. There is no need to be concerned about the legal use of tobacco, alcohol, or tablets.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

2. If I was older I would feel O.K. about getting drunk as long as I was not going to drive.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

3. People who smoke a packet of cigarettes each day are drug addicts.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

4. Marijuana does not do any harm to people who smoke it.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

5. Playing tennis, netball or doing things like pottery, sketching or painting have nothing to do with stopping people from getting involved with drugs.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

6. If some really good friends who had been drinking offered me a lift home in their car I'd take a chance and go with them rather than offend them.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

7. Advertising alcohol or cigarettes in papers or T.V. should be banned.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

8. If all my friends start smoking then I guess I would smoke when I was with them just to be sociable.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

9. If you have a headache or are very tense or worried the most sensible way of coping is to take a headache tablet or some pills from the chemist or doctor.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

10. If I was older, no matter how carefully I thought I could drive after having a few to drink, I still wouldn't risk driving home.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

11. Involvement in lots of hobbies and pastimes can stop young people from getting involved with drugs.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

12. I will probably start smoking when I'm older.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

13. If my friends wanted me to have another drink (at a party when I'm older) I would have it even though I'd had enough drinks rather than let my friend down.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

14. Marijuana is a health hazard and people who keep smoking it are affecting their health.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

15. If you are fed up and everything is getting too much you should go to the doctor and get some tablets to make you feel better.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

16. Smoking cigarettes is a dirty and unhealthy habit.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

17. It's O.K. to drive when you've been drinking as long as you are really careful.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

18. It's O.K. to drive if you've been drinking as long as you keep off the main roads.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

19. No matter what the circumstances, getting drunk is a stupid thing to do even though lots of adults and young people may do it quite often.

Strongly Agree	Agree	More or Less Agree	More or Less Disagree	Disagree	Strongly Disagree

SECTION 2

1. Have you ever had an alcoholic drink?

   Yes 1
   No 2

2. How old were you?

   Under age of 7 1
   7 or 8 years old 2
   9 or 10 years old 3
   11 or 12 years old 4

3. On how many days in the last four weeks did you have an alcoholic drink?

   None 1
   1-2 days 2
   3-5 days 3
   6-9 days 4
   0-19 days 5
   20 or more days 6

4. Have you ever smoked tobacco?

   Yes 1
   No 2

5. How old were you when you first smoked tobacco?

   Under age of 7 1
   7 or 8 years old 2
   9 or 10 years old 3
   11 or 12 years old 4

6. On how many days in the last four weeks have you smoked tobacco?

   None 1
   1-2 days 2
   3-5 days 3
   6-9 days 4
   0-19 days 5
   20 or more days 6

7. On a day when you smoke cigarettes how many would you usually smoke?

A few puffs 1
1-5 a day 2
About $\frac{1}{2}$ a packet 3
About $\frac{3}{4}$ a packet 4
About 1 packet 5

8. Have you ever used pain-killers, e.g. aspirin, disprin, panadol etc.?

Yes 1
No 2

9. On how many days in the last four weeks have you used pain-killers?

None 1
1-2 days 2
3-5 days 3
6-9 days 4
0-19 days 5
20 or more days 6

10. This is a question about any other drugs you may have used. If you have used any of these in your life please circle the answer that is right for you.

Marijuana (grass, joint)	NO	YES	1-2	3-5	6-9	10-19	20+

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

PLEASE NOTE: NONE OF YOUR ANSWERS ARE EVER TOLD TO ANYONE. ALL OF THESE ANSWERS WE FEED INTO A COMPUTER AND THEY COME OUT AS FIGURES THAT TELL RESEARCHERS ABOUT THE KIN OF DRUGS KIDS OF YOUR AGE USE AND WHAT KIND OF BELIEFS AND ATTITUDES THEY HAVE. THIS RESEARCH IS PART OF A UNIVERSITY OF WOLLONGONG RESEARCH PROJECT.

JEFFREY WRAGG
RESEARCHER
N.S.W. DEPT. OF EDUCATION AND
THE UNIVERSITY OF WOLLONGONG

Table 1 Comparison of Socio-Economic Status Levels between Intervention and Non-Intervention Group Subjects from Grade 7 to Grade 10

Grade at School	chi	df	p
Grade 7	3.86	5	.57
Grade 8	5.45	5	.36
Grade 9	5.75	5	.33
Grade 10	2.28	5	.81

Table 2 Corrected Item - Total Correlations, and Means and Standard Deviations, for Each of the 15 Scale Items Included in the Attitude Scale

Item Numbers and Descriptions	Grade 7			Grade 8			Grade 9			Grade 10		
	Correlation	Mean	SD	Correlation	Mean	SD	Correlation	Mean	SD	Correlation	Mean	SD
01 Concern about legal drug use	.44	2.71	1.50	.40	2.85	1.52	.51	2.178	1.54	.49	2.91	1.53
02 Getting drunk OK if not driving	.62	2.97	1.51	.61	3.26	1.72	.59	3.28	1.67	.54	3.42	1.71
03 Smokers are drug addicts	.27	3.04	1.44	.23	3.08	1.48	.33	2.91	1.47	.38	2.95	1.54
04 Marijuana is harmful	.43	1.87	1.14	.49	1.95	1.29	.55	2.03	1.32	.55	2.07	1.36
06 Not ride with friend who'd been drinking	.47	2.15	1.09	.37	1.97	1.18	.58	2.11	1.29	.50	2.09	1.27
07 Cig. and alcohol adds. should be banned	.33	2.85	1.60	.31	2.83	1.64	.45	2.89	1.58	.52	2.90	1.66
08 Not smoke if friends started	.61	2.14	1.23	.54	2.07	1.29	.51	2.01	1.38	.55	1.93	1.21
09 Pills from doctor for headache or tension	.36	3.09	1.34	.41	3.25	1.43	.38	3.42	1.44	.38	3.41	1.44
12 Probably won't start smoking	.57	2.12	1.23	.64	2.17	1.27	.54	1.96	1.26	.52	1.91	1.29
13 Keep drinking if friends insist	.64	2.06	1.09	.59	1.99	1.14	.49	1.97	1.11	.46	1.88	1.09
15 If fed up get pills from doctor	.41	2.64	1.32	.34	2.48	1.31	.40	2.61	1.30	.44	2.53	1.25
16 Cigarettes are dirty and unhealthy	.54	2.01	1.16	.44	2.12	1.42	.56	2.10	1.38	.49	2.01	1.31
17 OK to drive if careful	.57	1.81	1.00	.43	1.76	1.03	.43	1.84	1.09	.51	1.86	1.11
18 Try pills with friends	.55	1.81	1.00	.55	1.76	1.08	.62	1.81	1.16	.61	1.74	1.12
19 OK to drive if off main roads	.54	1.81	1.05	.51	1.79	1.11	.56	1.82	1.06	.53	1.77	1.05

Table 3 Intercorrelations Among Items in the Attitude Scale at each Grade Level

GRADE 7

Item	01	02	03	04	06	07	08	09	12	13	15	16	17	18	19
01															
02	.53														
03	.26	.34													
04	.32	.42	.19												
06	.19	.28	.15	.34											
07	.26	.33	.08	.23	.25										
08	.18	.36	.18	.30	.28	.33									
09	.33	.32	.25	.29	.17	.17	.10								
12	.26	.39	.30	.33	.29	.28	.46	.22							
13	.20	.37	.14	.30	.48	.30	.45	.23	.46						
15	.20	.28	.16	.27	.28	.21	.25	.43	.20	.36					
16	.33	.33	.26	.27	.32	.31	.31	.21	.45	.31	.16				
17	.20	.25	.18	.44	.46	.14	.29	.31	.34	.42	.30	.35			
18	.25	.36	.16	.45	.45	.25	.42	.25	.43	.56	.34	.40	.50		
19	.38	.39	.34	.41	.36	.08	.12	.39	.32	.28	.28	.37	.55	.50	

GRADE 8

Item	01	02	03	04	06	07	08	09	12	13	15	16	17	18	19
01															
02	.39														
03	.06	.19													
04	.34	.39	.16												
06	.16	.28	.17	.35											
07	.32	.40	.24	.36	.29										
08	.24	.20	.17	.32	.20	.29									
09	.24	.31	.11	.20	.13	.23	.28								
12	.33	.41	.22	.34	.32	.34	.44	.26							
13	.29	.37	.14	.36	.38	.24	.42	.27	.44						
15	.17	.26	.09	.14	.15	.12	.17	.43	.21	.31					
16	.24	.31	.22	.24	.32	.39	.23	.19	.44	.22	.15				
17	.23	.31	.05	.31	.42	.22	.30	.25	.24	.43	.28	.17			
18	.26	.37	.18	.36	.34	.25	.39	.22	.42	.44	.27	.28	.40		
19	.22	.35	.10	.37	.52	.25	.31	.23	.27	.44	.24	.26	.62	.40	

Table 3 (cont.)

GRADE 9

Item	01	02	03	04	06	07	08	09	12	13	15	16	17	18	19
01															
02	.41														
03	.19	.22													
04	.41	.37	.30												
06	.23	.30	.20	.39											
07	.37	.38	.28	.38	.26										
08	.20	.28	.19	.33	.38	.19									
09	.18	.26	.17	.24	.24	.10	.31								
12	.27	.41	.32	.42	.35	.32	.42	.23							
13	.29	.33	.21	.42	.35	.20	.43	.27	.44						
15	.24	.23	.17	.22	.29	.22	.18	.45	.23	.29					
16	.31	.38	.31	.36	.36	.34	.28	.24	.48	.37	.19				
17	.28	.27	.18	.34	.46	.32	.31	.21	.31	.33	.23	.27			
18	.32	.40	.29	.41	.44	.38	.34	.25	.41	.48	.30	.42	.48		
19	.30	.34	.24	.40	.48	.31	.31	.24	.38	.43	.26	.34	.71	.60	

GRADE 10

Item	01	02	03	04	06	07	08	09	12	13	15	16	17	18	19
01															
02	.46														
03	.28	.20													
04	.43	.42	.30												
06	.27	.24	.20	.42											
07	.33	.41	.33	.33	.19										
08	.31	.23	.19	.25	.35	.24									
09	.24	.23	.20	.23	.22	.18	.20								
12	.30	.37	.30	.35	.33	.31	.44	.19							
13	.27	.31	.17	.27	.32	.26	.47	.20	.34						
15	.25	.20	.26	.24	.33	.15	.19	.54	.22	.23					
16	.38	.31	.37	.28	.25	.41	.31	.15	.42	.26	.15				
17	.30	.26	.16	.40	.47	.23	.24	.18	.25	.37	.32	.26			
18	.34	.27	.26	.47	.48	.25	.34	.22	.33	.39	.34	.35	.52		
19	.34	.28	.11	.43	.48	.23	.26	.14	.27	.38	.32	.27	.80	.59	

Table 4 Summary Table of Principal Components Analysis (Unrotated Factor Matrix) for Attitude Scale in Grades 7-10

	Scale Item Grades 7 & 8	Factor 1	Factor 2	Factor 3		Scale Item Grades 9 & 10	Factor 1	Factor 2	Factor 3
	18	.73				18	.74		-.44
	13	.68				19	.72		
	02	.66				04	.67		
G	17	.66		-.46	G	12	.67		
R	19	.66			R	13	.65		
A	12	.65			A	17	.65		-.50
D	04	.65			D	06	.64		
E	06	.60			E	16	.62		
	16	.60				02	.61		
7	08	.56	-.46		9	08	.57		
	01	.53	.44			07	.55	.46	
	15	.51				01	.54		
	09	.50	.49			15	.47		.45
	07	.44		.48		09	.46	-.44	.55
	03	.41	.41			03	.45		
Eigenvalue		5.38	1.37	1.24	Eigenvalue		5.53	1.19	1.15
% Total Variance		35.9	9.2	8.3	% Total Variance		36.9	7.9	7.7
	13	.69				18	.72		
	12	.67				19	.70	-.53	
	19	.67	-.45			17	.68	-.51	
G	18	.66			G	04	.67		
R	02	.66			R	06	.64		
A	17	.62	-.53		A	01	.62		
D	04	.61			D	12	.61		
E	06	.60		-.44	E	13	.59		
	07	.56	.41			02	.58		
8	16	.52			10	16	.58		
	01	.51				08	.56		
	09	.48		.63		07	.53	.43	
	15	.44		.62		03	.46	.42	
	03	.??				09	.42		.76
						15	.51		.70
Eigenvalue		5.07	1.33	1.19	Eigenvalue		5.33	1.50	1.24
% Total Variance		33.8	8.9	8.0	% Total Variance		35.5	10.9	8.3

Appendix Two

Stem and leaf display for days drunk in the last month for Grade 7

```
10. 0000000000000000000000000000000000000000000000000000000000000000000+142
12.
14.
16.
18.
20. 00000000000000000000000000000000000000000000000000000000000000000
22.
24.
26.
28.
30. 00000
32.
34.
36.
38.
40. 00
```

Stem and leaf display for days drunk in the last month for Grade 9

```
1. 0000000000000000000000000000000000000000000000000000000000000000+52
1.
2. 00000000000000000000000000000000000000000000000000000000000000+25
2.
3. 000000000000000000000000
3.
4. 00000000000000
4.
5. 000
5.
6. 00
```

Stem and leaf display for days drunk in the last month for Grade 8

```
10. 0000000000000000000000000000000000000000000000000000000000000000000+75
12.
14.
16.
18.
20. 00000000000000000000000000000000000000000000000000000000000000000+23
22.
24.
26.
28.
30. 000000000000000000000000
32.
34.
36.
38.
```

Stem and leaf display for days drunk in the last month for Grade 10

```
1. 0000000000000000000000000000000000000000000000000000000000000000000+36
1.
2. 00000000000000000000000000000000000000000000000000000000000000000+33
2.
3. 0000000000000000000000000000000000000
3.
4. 000000000000000
4.
5. 000
5.
6. 000
```

Figure 1. Stem and leaf display of monthly alcohol use distributions

Stem and leaf display for days smoked last month for Grade 7

```
1. 0000000000000000000000000000000000000000000000000000000000000000+135
1.
2. 000000000000000000
2.
3. 00000000
3.
4. 00000
4.
5. 00000000
5.
6. 000
6.
7. 0000
```

Stem and leaf display for days smoked last month for Grade 9

```
1. 0000000000000000000000000000000000000000000000000000000000000000+124
1.
2. 000000000000000
2.
3. 000
3.
4. 00
4.
5. 0000000
5.
6. 00000000
6.
7. 00000000000000000000
```

Stem and leaf display for days smoked last month for Grade 8

```
1. 0000000000000000000000000000000000000000000000000000000000000000+129
1.
2. 00000000000000
2.
3. 00000000
3.
4. 00000
4.
5. 00000
5.
6. 0000
6.
7. 0000000000000000
```

Stem and leaf display for days smoked last month for Grade 10

```
1. 0000000000000000000000000000000000000000000000000000000000000000+111
1.
2. 000000000000000000000
2.
3. 0000000000
3.
4. 00
4.
5. 0000000
5.
6. 000
6.
7. 000000000000000000000000
```

Figure 2. Stem and leaf display of monthly tobacco use distribution

Stem and leaf display for days used analgesics in the past week for Grade 7

```
0.  0000000000000000000000000000000000000000000000000000000000000000+154
2.
4.
6.
8.
10. 000000000000000000000000
12.
14.
16.
18.
20. 000
22.
24.
26.
28.
30. 00000
32.
34.
36.
38.
40. 0
```

Stem and leaf display for days used analgesics in the past week for Grade 9

```
0.  0000000000000000000000000000000000000000000000000000000000000000+10
2.
4.
6.
8.
10. 000000000000000000000000000000000000000000000000000000
12.
14. 0
16.
18.
20. 000000000000000
22.
24.
26.
28.
30. 00000000
32.
34.
36.
38.
40. 0000
```

Stem and leaf display for days used analgesics in the past week for Grade 8

```
0. 0000000000000000000000000000000000000000000000000000000000000000+127
0.
1. 000000000000000000000000000000000000000000
1.
2. 00000000
2.
3. 0000
3.
4.
4.
5. 0
```

Stem and leaf display for days used analgesics in the past week for Grade 10

```
0. 0000000000000000000000000000000000000000000000000000000000000000+82
0.
1. 000000000000000000000000000000000000000000000000000000000000000+5
1.
2. 000000000000000000000000
2.
3. 00000000
3.
4. 0
4.
5. 0000
```

Figure 3. Stem and leaf display of monthly analgesic use distributions

Stem and leaf display for days smoked marijuana last month for Grade 7

```
0.  0000000000000000000000000000000000000000000000000000000000000000+175
2.
4.
6.
8.
10.
12.
14.
16.
18.
20.
22.
24.
26.
28.
30.  0000
```

Stem and leaf display for days smoked marijuana last month for Grade 9

```
0.  0000000000000000000000000000000000000000000000000000000000000000+164
2.
4.  00000
6.  0000
8.
10.
12.
14.  000
16.
18.
20.
22.
24.  0
26.
28.
30.  00
```

Stem and leaf display for days smoked marijuana last month for Grade 8

```
0.  0000000000000000000000000000000000000000000000000000000000000000+173
2.
4.  000
6.  0
8.
10.
12.
14.
16.
18.
20.
22.
24.
26.
28.
30.  00
```

Stem and leaf display for days smoked marijuana last month for Grade 10

```
0.  0000000000000000000000000000000000000000000000000000000000000000+162
2.
4.  000000
6.  0000
8.
10.
12.
14.  000
16.
18.
20.
22.
24.  00
26.
28.
30.  00
```

Figure 4. Stem and leaf display of monthly marijuana use distributions

Appendix Three

Table 1 Percentage of Subjects for All Group and Group Levels Who Have Ever Drunk Alcohol

Cross Sectional Group (Total N=619)	Grade Level	Ever Drank Alcohol		
		Use of Alcohol	Never Used Alcohol	N
Intervention Group Responses	6	65.4	34.6	358
	7	81.6	18.4	239
	8	92.1	7.9	241
	9	95.1	4.9	285
	10	96.9	3.1	258
Non Intervention Group Responses	6	60.4	39.6	250
	7	88.3	11.7	180
	8	94.8	5.2	172
	9	96.3	3.7	215
	10	96.6	3.4	178
Combined Set of Responses	6	63.3	36.7	608
	7	84.5	15.5	419
	8	93.2	6.8	413
	9	95.6	4.4	500
	10	96.8	3.2	436

Table 2 Levels of Monthly and Weekly Use of Alcohol for all Subjects and Grade Levels

Group	Grade Level	Number of Days Consumed Alcohol During Last Month (Percent)								Number of Days Consumed Alcohol During Past Week (Percent)					
		(N)	Nil	1-2	3-5	6-9	10-19	20+	Every day	(N)	Nil	1-2	3-4	5-6	Every day
	6	(357)	94.1	5.3	.6	-	-	-	-						
Intervention	7	(239)	79.5	17.6	2.5	.4	-	-	-	(239)	95.4	4.6	-	-	-
Group	8	(240)	57.9	32.5	9.2	.4	-	-	-	(240)	76.7	22.9	.4	-	-
Responses	9	(285)	46.7	31.6	13.0	6.3	.7	1.4	.4	(285)	73.0	22.1	3.9	.4	.7
	10	(258)	36.8	41.9	15.1	4.7	1.2	.4	-	(258)	66.3	29.1	3.5	.4	.8
Non	6	(249)	94.0	6.0	-	-	-	-	-						
Intervention	7	(180)	51.1	40.0	7.2	1.1	.6	-	-	(180)	80.6	17.2	1.7	.6	-
Group	8	(172)	45.3	38.4	14.5	1.2	.6	-	-	(172)	68.6	27.9	2.9	.6	-
Responses	9	(215)	38.6	36.3	17.7	4.7	1.9	.5	.5	(215)	67.9	29.3	2.3	.5	-
	10	(178)	31.5	39.3	18.0	7.3	1.7	2.2	-	(178)	50.6	43.8	4.5	1.1	-
	6	(606)	94.1	5.6	.3	-	-	-	-						
Combined	7	(419)	67.3	27.2	4.5	.7	.2	-	-	(419)	89.0	10.0	.7	.2	-
Set of	8	(412)	52.7	35.0	11.4	.5	.2	.2	-	(412)	73.3	25.0	1.5	.2	-
Responses	9	(500)	43.2	33.6	15.0	5.6	1.2	1.0	.4	(500)	70.8	25.2	3.2	.2	.6
	10	(436)	34.6	40.8	16.3	5.7	1.4	1.1	-	(436)	59.9	35.1	3.9	.7	.5

Table 3 Amount of Alcohol Typically Drunk for All subjects Across All Grade Levels

Cross Sectional Group (Total N=619)			Usual Amount of Alcohol Drunk						
		(N)	Nil	Few Sips	1-2 drinks	3-4 drinks	5-8 drinks	9-12 drinks	12+ drinks
Intervention Group Responses	7	239	24.7	55.6	17.2	1.3	.8	.4.	-
	8	240	17.1	42.1	29.6	7.5	2.9	.4	.4
	9	284	13.7	31.7	29.2	10.9	7.7	3.5	3.2
	10	256	11.3	23.0	30.9	12.9	14.1	3.5	4.3
Non Intervention Group Responses	7	179	12.8	50.3	29.1	6.7	1.1	-	-
	8	172	14.0	29.7	37.2	8.7	4.7	2.3	3.5
	9	213	13.6	24.9	27.7	16.4	9.9	3.8	3.8
	10	178	8.4	13.5	27.5	14.0	20.8	6.7	9.0
Combined Set of Responses	7	418	19.6	53.3	22.2	3.6	1.0	.2	-
	8	412	15.8	36.9	32.8	8.0	3.6	1.2	1.7
	9	497	13.7	28.8	28.6	13.3	8.7	3.6	3.4
	10	434	10.1	19.1	29.5	13.4	16.8	4.8	6.2

Table 4 Self Reported Effects of Alcohol Consumed for All Grade Levels

CrossSectional Group			Effects from Drinking Alcohol					
		(N)	Nil - no Effects	Hardly Any	Tipsy	Fair Bit Drunk	Very Drunk	Passed Out
Intervention Group Responses	7	238	83.2	12.6	2.1	1.3	.4	.4
	8	240	69.2	17.9	8.8	2.1	1.3	.8
	9	284	62.3	14.4	9.2	8.8	4.6	.7
	10	255	51.8	17.6	10.6	12.2	6.7	1.2
Non Intervention Group Responses	7	178	70.2	22.5	5.1	1.7	.6	-
	8	172	57.6	17.4	14.0	5.8	4.1	1.2
	9	211	50.2	18.5	14.2	12.8	3.3	.9
	10	178	43.8	12.9	15.7	16.3	8.4	2.8
Combined Set of Responses	7	416	77.6	16.8	3.4	1.4	.5	.2
	8	412	64.3	17.7	10.9	3.6	2.4	1.0
	9	495	57.2	16.2	11.3	10.5	4.0	.8
	10	433	48.5	15.7	12.7	13.9	7.4	1.8

Appendix 3: Explanation and Formula for Rate of Change Analyses

The median drug behaviour of each grade is a "psychological" indicator of peer pressure levels for drug participation. The pressure on children is not necessarily to follow the extremes, but to follow the "crowd" (medium user). The median will hence be taken as a measure of the central drug usage.

A comparison of the growth curve rate of change model for intervention and non-intervention group drug use behaviour was analysed separately in order to identify if the best fitting model was achieved with a linear quadratic, cubic or polynomial order 4 term. The mathematical formula for each of the four possible models is provided in Appendix 3 and additional explanation regarding the method of backward elimination is also included Appendix 3.

The next stage of the analysis is to model this growth using a polynomial model with time (t) as the explanatory variable (i.e. t = 1,2,3,4 and 5 for grades 6,7,8,9 and 10 respectively). We start by selecting which model is most appropriate for explaining the growth in the drug behaviour. Once this model form has been selected, then the best fitting model will be used to explain the growth of each group. The growth model was selected only for the group of children that used the drug sometime during the grade 6 to grade 10. This was done because the growth model for the non-users for the study period is known to be nil.

$$
\begin{aligned}
y &= Bo + B_1t + B_2t^2 + B_3t^3 + B_4t^4 + e \text{ (polynomial order 4)} \\
&= Bo + B_1t + B_2t^2 + B_3t^3 \text{ (polynomial order 3 - cubic)} \\
&= Bo + B_1t + B_2t^2 \text{ (polynomial order 2 - quadratic)} \\
&= Bo + B_1t \text{ (polynomial order 1 - linear)}
\end{aligned}
$$

Let a user be defined as a child who has used the drug during the study period (i.e. Year 6 to Year 10).

Let y_{ijt} be the ith "user from the jth group"'s behaviour level in time t. We wish to fit the model

$$y_{ijt} = \tilde{\mu}_{jt} + e_{ijt}$$

where: $\tilde{\mu}_{jt}$ is given by the following model

$$\tilde{\mu}_{jt} = \tilde{\beta}_{0j} + \tilde{\beta}_{1j}t + \tilde{\beta}_{2j}t^2 + \tilde{\beta}_{3j}t^3 + \tilde{\beta}_{4j}t^4$$

where: $\tilde{\beta}_{\ell j}$ are the median regression parameters for the growth in drug usage.

Let

$$Y_j = \begin{bmatrix} y_{ij0} & \cdots & y_{ij4} \\ \vdots & \ddots & \vdots \\ y_{nj j0} & \cdots & y_{nj j4} \end{bmatrix}, \qquad \text{then}$$

$$Y_j = 1_{n_j}[\beta_{j0}\beta_{j1}\ldots\beta_{j4}] \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 4 & 9 & 16 & 25 \\ 1 & 8 & 27 & 64 & 125 \\ 1 & 16 & 81 & 256 & 625 \end{bmatrix} + E_j$$

where: E_j is the error matrix which differs, in distribution, significantly from normal.

Define $\underset{\sim}{v}_{\ell}$ as a 5×1 vector which is orthogonal to the ℓth row of $(\ell \neq k)$

$$p = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 4 & 9 & 16 & 25 \\ 1 & 8 & 27 & 64 & 125 \\ 1 & 16 & 81 & 256 & 625 \end{bmatrix}, \qquad \text{i.e.} \qquad \underset{\sim}{v}_k^t \underset{\sim}{p}_{\ell} = 0, \qquad \text{but not orthogonal to the } k\text{th row.}$$

For the sake of uniqueness, let $\underset{\sim}{v}_k$ be of unit length. Note that $\underset{\sim}{v}_k^t \underset{\sim}{p}_k = c_k$ is not equal to zero, hence

$$Y_j \underset{\sim}{v}_k = c_k 1_{n_j}[\tilde{\beta}_{j0}\tilde{\beta}_{j1}\ldots\tilde{\beta}_{j4}]\underset{\sim}{j}_k + E_j v_j$$

where: $\underset{\sim}{j}_k^t = \begin{bmatrix} 1 & \ldots & k & \ldots & s \\ 0 & \ldots & 1 & \ldots & 0 \end{bmatrix}$. Therefore

$$Y_j \underset{\sim}{v}_k = c_k \underset{\sim}{1}_{n_j}\tilde{\beta}_{jk} + E_j \underset{\sim}{v}_k.$$

The one sample Wilcoxon test can be used to test the hypothesis

$$H_0 : \tilde{\beta}_{jk} = 0 \quad \text{vs} \quad H_a : \tilde{\beta}_{jk} \neq 0.$$

This is carried out sequentially for $k = 5, 4, 3, 2, 1$, until H_a is accepted, at which stage all $\tilde{\beta}'_{j\ell}s$ with ℓ smaller than or equal to the stopping k, will be assumed to differ from zero. The process will be used to select the model to fitting the growth of drug behaviour.

Appendix Four

Table 1 Use of Tobacco and Analgesics by Intervention and Non-Intervention Group Subjects at Pretest in Grade 6

Drug Use Category	Cross-Sectional Sample (N=619)	
	Mann-Whitney* z value	Sig. level
Ever smoked tobacoo	-0.53	.60
Last month's use of tobacco	-1.47	.14
Ever used analgesics	-0.77	.44
Last month's use of analgesics	-0.89	.37

* 2-tailed significance level

Table 2 Logistic Regression Analyses Examining Use or Non Use (incidence) of Tobacco Between Intervention and Non-Intervention Group Subjects (N=239)

	Cross-Sectional Sample	
	Constant	Intervention Group
Grade 7	.32 (.16)	-.86* (.21)
Grade 8	.98 (.19)	-1.04* (.22)
Grade 9	1.44 (.19)	-0.9** (.21)
Grade 10	1.41 (.20)	0.83* (.24)

*p<.05 **p<.01

Note: No significant interaction effects were found for analgesics use and intervention and non-intervention group status

Table 3 Levels of Monthly and Weekly Tobacco Use for all Subjects and Grade Levels for Complete Group (Cross-Sectional Analysis)

Group	Grade Level		Days Smoked Tobacco During the Last Month (Percent)							Days Smoked Tobacco During the Last Week (Percent)				
		(N)	Nil	1-2	3-5	6-9	10-19	20+	Everyday	Nil	1-2	3-4	5-6	Everyday
Intervention group responses	6	(355)	88.2	8.2	3.4	.3	-	-	-					
	7	(239)	86.6	5.9	1.7	1.7	2.5	1.3	.4	92.5	4.2	1.7	1.7	-
	8	(241)	83.8	4.6	2.1	3.3	2.5	.4	3.3	88.4	5.0	2.1	1.2	3.3
	9	(285)	73.0	7.7	3.3	1.2	2.5	2.5	10.2	79.3	6.0	2.8	.7	11.2
	10	(258)	71.7	5.4	3.9	2.7	.8	3.1	12.4	76.4	7.0	1.2	3.5	12.0
Non intervention group responses	6	(250)	92.0	4.7	1.6	1.2	2.4	-	-					
	7	(180)	64.0	11.7	6.1	4.4	6.7	3.9	3.3	75.6	10.6	3.9	6.1	3.9
	8	(172)	59.7	11.6	7.0	2.3	3.7	4.7	11.0	69.8	11.0	2.3	4.8	12.1
	9	(215)	64.2	7.4	3.3	2.8	4.7	3.3	14.4	71.6	6.4	3.3	3.3	15.4
	10	(178)	61.2	7.9	4.5	2.2	3.4	1.1	19.7	71.3	4.5	3.9	1.1	19.1
Combined set of responses	6	(605)	89.8	6.8	2.6	.7	.2	-	-					
	7	(419)	76.8	8.4	3.6	2.9	4.3	2.4	1.7	85.2	6.9	2.6	3.6	1.7
	8	(413)	73.4	7.5	4.1	2.9	3.4	2.2	6.5	81.0	7.5	2.2	2.0	7.3
	9	(500)	69.2	7.6	3.2	1.8	3.4	2.8	12.0	76.2	6.0	3.0	1.8	13.0
	10	(436)	67.4	6.4	4.1	2.5	1.8	2.3	15.4	74.3	6.0	2.3	2.5	14.9

Table 4 Monthly Frequency of Analgesic Use and Number of Tablets Taken Last Week for all Subjects at all Grade Levels

Group	Grade Level	Days Used Analgesics During the Past Month (Percent)								Number of Analgesics Taken During Past Week (Percent)						
		(N)	Nil	1-2	3-5	6-9	10-19	20-30	14-27 28 or more	Everyday	(N)	Nil	1-2	3-6	7-13
Intervention group responses	6	(360)	67.5	25.3	5.8	1.4	-	-	-	-					
	7	(239)	64.4	28.9	5.0	1.7	-	-	-	(223)	91.0	7.6	.9	.4	-	-
	8	(241)	46.9	40.7	7.51	2.65	1.2	1.2	.4	(228)	75.9	18.0	4.4	1.3	.4	-
	9	(285)	35.8	44.6	12.3	4.9	1.4	.4	.7	(275)	68.7	21.8	6.5	2.2	.7	-
	10	(258)	31.4	42.2	17.4	5.8	1.6	1.6	-	(249)	59.4	24.9	10.4	2.4	1.6	1.2
Non intervention group responses	6	(250)	70.8	23.2	4.8	1.2	-	-	-							
	7	(180)	47.8	41.1	8.9	1.7	.6	-	-	(171)	80.7	16.4	2.9	-	-	-
	8	(172)	45.9	40.1	11.0	1.7	.6	.6	-	(166)	73.5	20.5	3.6	1.8	.6	-
	10	(178)	28.1	44.9	16.3	7.9	.6	.6	1.7	(174)	60.9	23.6	10.9	2.9	.6	1.1
Combined Set of Responses	6	(610)	68.9	24.4	5.4	1.3	-	-	-							
	7	(419)	57.3	34.1	6.7	1.7	.2	-	-	(394)	86.5	11.4	1.8	.3	-	-
	8	(413)	46.5	40.4	8.7	2.2	1.0	1.0	.2	(394)	74.9	19.0	4.1	1.5	.3	.3
	9	(500)	35.4	44.4	11.8	5.2	2.0	.4	.8	(479)	66.5	21.9	7.5	2.7	1.3	.2
	10	(436)	30.0	43.3	17.0	6.7	1.1	1.1	.7	(423)	60.0	24.3	10.6	2.6	1.2	1.2

Appendix Five

Table 1 Percentage of Subjects for All Groups and Grade Levels Who Have Ever Used Marijuana

Group	Grade Level	Not Used	Used	Number
Experimental Group	6	97.5	2.5	358
	7	95.0	5.0	238
	8	87.1	12.0	241
	9	76.8	23.2	285
	10	73.8	26.2	258
Control Group	6	96.7	3.3	243
	7	88.9	11.1	180
	8	69.8	30.2	172
	9	60.0	40.0	215
	10	59.6	39.4	178
Combined Set of Responses	6	97.2	2.8	601
	7	92.4	7.6	419
	8	79.9	20.1	500
	9	69.2	30.6	497
	10	67.9	32.1	436

Table 2 Levels of Yearly and Monthly Marijuana Use for All Subjects and Grade Levels

Group Level	Grade		Times Used Marijuana During the Last Year (Percent)							Times Used Marijuana During the Last Months (Percent)						
		(N)	Nil	1-2	3-5	6-9	10-19	20-39	40+	Nil	1-2	3-5	6-9	10-19	20-30	Everyday
Experimental Group Responses	6	(358)	97.5	2.5	-	-	-	-	-	-	-	-	-	-	-	-
	7	(239)	95.0	1.3	1.3	1.3	.8	.4	-	98.7	.8	.4	-	-	-	-
	8	(241)	89.2	4.1	2.1	1.7	1.7	1.2	-	97.1	2.1	.4	.4	-	-	-
	9	(285)	78.9	6.7	3.9	3.2	2.5	2.8	2.1	92.3	2.1	2.8	1.4	1.4	.4	-
	10	(258)	79.1	5.8	2.7	3.1	2.7	2.3	4.3	91.9	2.7	2.3	2.3	.4	.4	-
Control Group Responses	6	(243)	96.7	3.3	-	-	-	-	-	-	-	-	-	-	-	-
	7	(180)	89.4	5.6	2.2	1.1	1.1	.6	-	98.3	.6	1.1	-	-	-	-
	8	(172)	71.5	14.0	3.5	3.5	3.5	2.9	1.2	93.0	2.3	2.9	1.7	-	-	-
	9	(215)	63.7	14.0	6.5	2.8	4.7	2.8	5.6	87.4	4.2	2.3	2.8	1.9	1.4	-
	10	(178)	66.9	10.1	5.1	3.9	3.4	3.4	7.3	87.1	3.4	2.2	2.2	1.7	3.4	-
Combined Set of Responses	6	(601)	97.2	2.8	-	-	-	-	-	-	-	-	-	-	-	-
	7	(419)	92.6	3.1	1.7	1.2	1.0	.5	-	98.6	.7	.5	.2	-	-	-
	8	(413)	81.8	8.2	2.7	2.4	2.4	1.9	.5	95.4	2.2	1.5	1.0	-	-	-
	9	(500)	72.4	9.8	5.0	3.0	3.4	2.8	3.6	90.2	3.0	2.6	2.0	1.6	.6	-
	10	(436)	74.1	7.6	3.7	3.4	3.0	2.5	5.5	89.9	3.0	2.3	2.3	.9	1.6	-

Table 3 Grade by Grade Comparisons of Marijuana Use for Experimental and Control Group Subjects for Cross-Sectional Sample. (Mann-Whitney U test z scores)

Grade Level	Number of Times Used Marijuana Last Year		Number of Times Used Marijuana Last Month	
	z	p	z	p
Grade 6 (N=601)	.56	.57	-[a]	-
Grade 7 (N=419)	2.08	.04	-0.79	.43
Grade 8 (N=413)	-4.29	.000	-2.64	.008
Grade 9 (N=500)	-3.04	.002	-1.84	.07
Grade 10 (N=436)	-2.43	.02	-1.58	.11

[a] Monthly rates of marijuana use are zero in Grade 6.

Table 4 Percentage of Subjects for All Groups and Grade Levels Who have Ever Used Inhalents, Hallucinogenics and Opiates

Group	Grade Level	(Number)	Inhalent Use Last Year		Hallucinogenic Ever		Opiate Use Ever	
			Used	Not Used	Used	Not Used	Used	Not Used
Intervention Group	7	(236)	12.3	87.7	.8	99.2	.4	99.6
	8	(240)	14.6	85.4	1.2	98.8	1.2	98.8
	9	(281)	18.0	81.9	4.9	95.1	3.2	96.8
	10	(254)	9.4	90.6	4.0	96.0	2.8	97.2
Non Intervention Group	7	(175)	17.1	82.0	2.3	97.7	.6	99.4
	8	(171)	22.2	77.8	3.5	96.5	4.7	95.3
	9	(212)	15.6	84.4	9.0	93.0	6.1	93.6
	10	(174)	13.8	86.2	9.5	90.5	5.9	94.1
Combined Set of Responses	7	(411)	14.4	85.6	1.5	98.5	0.5	99.5
	8	(411)	17.8	82.2	2.2	97.8	2.7	97.3
	9	(493)	17.2	82.8	5.8	94.2	4.4	95.6
	10	(428)	11.2	88.8	6.2	93.8	4.1	95.9

Table 5 Grade by Grade Comparisons for Experimental and Control Group Subjects on the Use of Inhalents, Hallucinogenics and Opiates (Cross-Sectional Group)

Grade Level	Number of Times Used Inhalents During Past Year		Number of Times Ever Used Hallucinogenics		Number of Times Ever Used Opiates	
	z	p*	z	p*	z	p*
Grade 7 (N=411)	-1.39	.08	-1.19	.12	-0.19	.42
Grade 8 (N=411)	-1.90	.03	-1.54	.06	-2.11	.02
Grade 9 (N=493)	-1.08	.14	-1.03	.15	-1.56	.06
Grade 10 (N=428)	-1.38	.08	-2.25	.01	-1.59	.055

* Probabilities are quoted for a Mann-Whitney 1-tailed test.

Table 6 A Comparison Regarding the Age at Which Intervention and Non-Intervention Group Subjects Commence Use of Alcohol, Tobacco and Marijuana

Grade Level	Ever Used Alcohol		Ever Used Tobacco		Ever Used Marijuana	
	z	p	z	p	z	p
Grade 6*	-1.24	.21	-.12	.91	-	*
Grade 7	-.63	.28	-4.76	.000	-2.21	.014
Grade 8	-.13	.45	-4.22	.000	-4.42	.000
Grade 9	-1.18	.12	-2.73	.003	-4.19	.000
Grade 10	-1.31	.10	-1.96	.025	-3.41	.001

* The significance level quoted at Grade 6 is for a Mann-Whitney 2 tailed test, all other probabilities are 1 tailed.

Appendix Six

Path Analysis Examining the Relationship Between Attitudes to Drug Use and Non Drug Use Status (a) Non Smokers (b) Non Marijuana Users (c) Non Alcohol Users

(a) Non Smokers

Strong relationships between attitudes throughout Grades 7 to 10 exist for non-smokers and are presented in Figure 1. Standardized betas are fairly consistent between attitudes in Grades 7 and 9 (.65, .68) but there is a noticeable drop in magnitude (.58) between Grades 9-10 where only 34% of the variance regarding attitudes to drug use is accounted for by earlier attitudes. At Grade 8 and Grade 9 46% and 43% of the variance is accounted for by drug use attitudes one year earlier. In general terms the attitudes of non smokers are fairly consistent and it appears that earlier attitudes are significantly related to attitudes held at a later stage. As age increases, however, student attitudes seem to be less dependent on attitudes to drug use recorded at earlier times. This is particularly noticeable between Grades 9 and 10 where the magnitude of the path coefficient drops and the levels of unexplained variance increases.

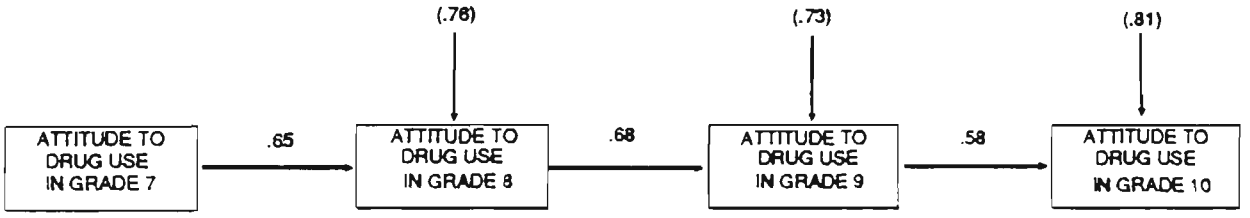

Figure 1. Path analysis of non smokers' attitudes to drug use. (n=66)

(b) Non Marijuana Users

The attitudes of non users of marijuana are presented in Figure 2. Standardized betas are generally high indicating that attitudes remain fairly stable during high school although there is a general decline in magnitude between Grades 8 and 9. In comparison to Grade 8 when 57% of the variance for attitudes to drugs is explained by prior drug use attitudes only 45% of the explained variance comes from prior attitudes in Grades 9 and 10. Although earlier attitudinal factors are significantly related to later attitudes a number of other varaibles which remain unidentified also appear to play a significant role in maintaining attitudes.

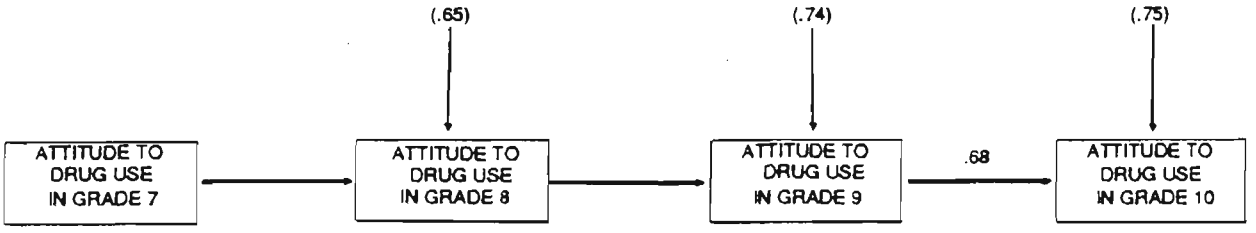

Figure 2. Path analysis of non marijuana users' attitudes to drug use. (n=159)

(c) Non Alcohol Users

Figure 3 presents an analysis of attitude relationships between successive Grades for individuals who do not use alcohol. Attitudes of non users remain fairly constant and standardised betas are quite high (.86 to .76) although there is a drop in the level of variance explained at each Grade (ranging from 74% at Grade 8 to 59% at Grade 10). Nevertheless the correspondence between each set of attitudes is consistently strong and this provides a point of comparison between non users and users of alcohol. As individuals begin to use alcohol changes in the magnitude of standardised betas tends to occur either just prior to monthly initiation or in the following period after monthly use has become established.

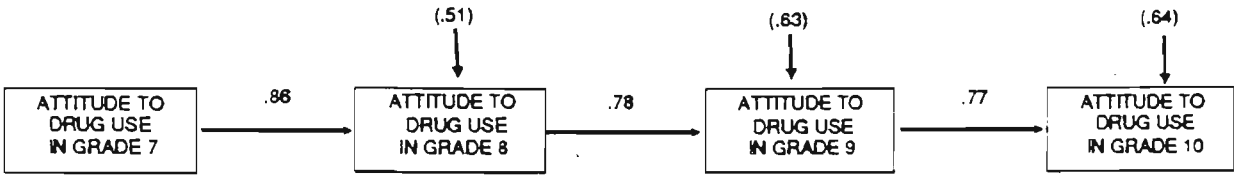

Figure 3. Path analysis of non alcohol users' attitudes to drug use. (n= 49)

Addendum

Addendum to the Thesis in Accordance with Examiner Suggestions.

Drug Education in Australia: A Review of the Curriculum Development Literature.

According to Walker (1987) expansion in the curriculum development field in the last three decades has provided a number of significant lessons for the design of drug education programs. An expanding list of educational researchers (Garrard, 1990; Irwin, 1991; Kolbe and Iverson, 1981; Leithwood and Montgomery 1980; Thompson, 1988a) highlight what they regard as the methodological weaknesses concerned with outcome only assessments and support the need for research on the implementation of school based programs. This brief review examines the arguments put forward by the curriculum development movement.

Garrard (1990) argues that evaluation of drug education has tended to focus on a rather limited group of strategies concerned with program effectiveness. Such evaluations have failed to consider wider educational, social and cultural factors that provide the social setting and educational context in which drug education programs are embedded. Thompson (1988a) suggests that recent reviews of evaluation literature highlight the fact that many programs are either not implemented or are not implemented in the manner presumed by the program designers. She suggests that this problem undermines the ability to make inferences about program effectiveness. Daly and Richards (1991) also suggest that quantitative methods of evaluation have led to narrow over-simplified beliefs regarding health care. Because the vast majority of drug education programs have failed to prove their worth (Bagnell, 1991; Bangert-Drowns, 1988; Grant, 1984;

Moskowitz, 1989 and Tobler, 1986) it appears that the curriculum development movement has chosen to reformulate objectives away from an evaluation of outcome to an evaluation of process.

There is little doubt that the drug education literature abounds with stories of adoption and abandonment of drug education innovations, and as Walker (1987) points out there is a need to recognise the fact that school-based curriculum products, developed by drug educators, cannot by-pass the teacher. According to Kolbe and Iverson (1981) effectiveness is ultimately determined by whether the program is implemented, and how it is implemented. Thompson (1988b) argues for a shift away from a prescriptive model of curriculum development towards a support for educational processes which will encourage schools to bring about improvements in their own educational programs. Thompson suggests that ready made programs cannot be developed and marketed from outside the system and drug education must be regarded as a process not a product. Walker (1987) in citing the work of Stenhouse (1975) identifies the central task of drug educators as not to develop materials, but to frame curriculum in the form of educational proposals which are testable at the classroom level. From this perspective concepts of success and failure with regard to subsequent drug use may become irrelevant.

Wallace (1984) takes the argument even further and suggests that because there has been little evidence to indicate that the target behaviour of reduced drug use has been achieved drug education may not be a process that is even amenable to evaluation in terms of specific behavioural goals. Rolley and Wallace (1987) in commenting on the Schaps et al (1981) review of drug education outcomes cite the

recommendation that outcome evaluation is probably premature at this stage. It is interesting to note the inconsistencies prevalent in the drug education literature when one year later the United States Office of Education (Roger, 1982) stated that the future challenge for drug educators "is not to demonstrate new approaches to cope with the problem but in getting the proven approaches into widespread and effective practice"(p.36). Irwin (1991) almost ten years later echoes these sentiments and suggests that the innovation most needed is that of program implementation research to overcome barriers that have prevented diffusion and dissemination of drug education. This is despite the fact that almost no evaluation studies overseas, or in Australia, have been able to adequately identify or discover the `magic ingredients` that can produce significant reductions in drug use behaviour.

Walker (1987) and Irwin (1991) point out schools alone cannot solve the problems of drug abuse. Drug educators, according to Irwin (1991), need to be more involved in social change where innovation and invention of new ideas are implemented in a social system. No one would argue against the belief that schools alone cannot be effective in changing adolescent drug use behaviour. There is also great value in recognising the problems associated with implementation and adoption issues, but it is debatable whether a collaborative action based research model reflecting a wide diversity of beliefs regarding what form drug education programs should take can offer a more adequate refocus. In choosing to reformulate the nature of the debate the curriculum development movement has changed the nature of success or failure away from drug use outcomes towards the development of effective educational processes which encourage

implementation and ownership of programs. This shift in emphasis may mean that drug education will again fail to come to grips with the major dependent variable of drug use.

Examples of Australian drug education programs based on a collaborative needs based curriculum development model have taken centre stage during the past five years. The Primary School Drug Education Evaluation Project (PSDE) (Thompson, 1988b) employed an action research model in which a participatory and collaborative partnership between teachers and key stakeholders occurred. The main focus of the research was on what happened in the classroom. Action research, from this perspective, is regarded as a "spiral of self reflection" where teachers become researchers in order to examine their own classroom practice. The evaluation of the PSDE program in 1988 examined student knowledge attitudes to drugs and health and self esteem measures. Data were collected before and immediately after the intervention phase. No measures of drug use behaviour were obtained.

The model of program evaluation used by Garrard and Knight (1989) in establishing the Health Education Pilot Project (HEPP) in Victoria was based on a formative evaluation approach previously used by educational researchers such as Stake (1967). Stufflebeam (1971) and Parlett and Hamilton (1976). The intended outcomes of evaluation were largely focussed on the operation and activities of the project team in relation to the development and implementation of health and drug education rather than on the effects of these programs on later drug use behaviour. Both the HEPP project in Victoria and the more recently developed Schools Development in Health Education Project

(Irwin, et al 1990) indicate their commitment to evaluation, but both projects appear to be mainly concerned with process or impact evaluation. Outcome evaluation is largely or completely ignored.

The role of the drug educator in the context of the curriculum development movement is to facilitate the ownership of the drug education innovation and to assist schools in the complex process of planning and implementing programs suited to each school and community context. This is an important role and projects of this nature can offer insight into ways to identify procedures and practices to overcome the barriers to diffusion and dissemination of drug education innovations. The problem that still remains however, is to demonstrate that such programs can reduce harmful drug use behaviour, and in relation to this question the curriculum development movement is silent.

The Thesis Argument: The Need to Develop an Empirically Derived Conceptual Model as the Basis for Drug Education.

It is because school drug education has generally failed to show changes in drug use behaviour that the curriculum development movement has reframed the debate away from behavioural outcomes towards a wider set of factors regarding social, cultural and professional intervention issues. However the failure of drug education programs to prevent subsequent drug use should be linked more appropriately to a failure to adequately examine and develop drug education models that reflect an understanding of the psychosocial determinates of adolescent drug use. Most failed drug education endeavours, reported in the literature, were based on simplistic, univariate formulations developed from a conceptually limited and

methodologically flawed base. A process based re-analysis can provide additional insights and suggest important ways to develop commitment and encourage site implementation but it is imperative that a core curriculum is identified. This curriculum should be derived from models of drug education that have empirically demonstrated their ability to change drug use behaviour.

The argument developed in this thesis has been that drug education has failed to make a significant impact on adolescent drug use because inadequate conceptual and theoretical development occurred and many so-called `models' of drug education were based upon naive, simplistic or incorrect assumptions. Process and action based research evaluations can assist with the implementation and adoption of empirically derived and substantiated drug programs, but these programs must be first developed and evaluated using a longitudinal methodology in order to test their effectiveness. The primary aim of this thesis has been to develop a sound theoretically based and empirically driven model of drug education that can change drug use behaviour.

Testing the Model and Testing the Program

There are of course problems that can emerge from making the assumption that program success provides unequivocal support for a particular model. Unless an adequately developed conceptual model of drug education provides clear implications for the construction of an intervention program the model, and the program, cannot be satisfactorily linked together for the purposes of evaluation. There are also specific socio-cultural, personality and implementation factors

that may occur in single site trials of program effectiveness that are unique to that setting and not readily transferable from one location to the general model.

Although interventions occurred in four separate primary schools feeding two high schools, the limited scope of the intervention makes it difficult to argue that it is completely free from such problems. The development of the Psychosocial Developmental Influences Model has however provided a strong conceptual base from which clear implications for curriculum design have been developed and translated into program components. Whilst it is not possible to argue that the model and the intervention program are completely identical it is however possible to suggest that the linkages between the two are clearly delineated and explicit. It is also possible to suggest that the fundamental arguments developed in this thesis, regarding the need to develop a sound theoretical and empirically derived model from which drug education can proceed, have been supported by the results. This research provides a strong argument to support the continued development of models of drug education based on sound theoretical and empirical evidence to show that drug use behaviour can be changed.

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