ADOLESCENT SMOKING, DRINKING AND DRUG USE

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KEY FINDINGS

Tobacco smoking, alcohol consumption and drug use all rose dramatically between ages 12 and 15, although there was a particularly sharp increase around age 13 to 14.

Girls were more likely than boys to smoke from age 13 and drink alcohol from age 14, and equally likely to take drugs from age 14.

Age of starting was lowest for alcohol, followed by smoking and then illicit drug use. Early experimentation resulted in behavioural continuity for all three substances, demonstrated by the high proportion of drinkers, smokers and drug users at age 12 who continued to report such behaviours at subsequent sweeps.

Alcohol, tobacco and illicit drug use are closely inter-related and demonstrate a high level of dose-dependence, whereby increased frequency of use of one coincides with increased frequency of use of the other. Within each substance type, there is evidence of sequential progression from occasional use at one age to regular use later.

Multiple substance users report higher levels of delinquency and victimisation; higher impulsivity and lower self-esteem; greater involvement in unconventional activities; weaker parental supervision and stronger peer influence than single substance users and non-users.

These findings are supportive of policies that recognise the close links between tobacco, alcohol and illicit drug use and ensure that education or health-based initiatives involve an integrated response. Early intervention may be most effective in terms of preventing continued and more serious misuse in later adolescence.

INTRODUCTION

The purpose of this paper is to explore the relationships and inter-dependence between tobacco, alcohol and illicit drug use in adolescence and the characteristics of substance users. It draws on the findings of the Edinburgh Study of Youth Transitions and Crime, a longitudinal research programme exploring pathways in and out of offending for a cohort of around 4,300 young people who started secondary school in the City of Edinburgh in 1998. The key aims and methods of the study are summarised below[1].

Aims of the programme

- To investigate the factors leading to involvement in offending and desistance from it
- To examine the striking contrast between males and females in criminal offending
- To explore the above in three contexts:
  - Individual development
  - Interactions with formal agencies of control
  - The social and physical structures of neighbourhoods
- To develop new theories explaining offending behaviour and contribute to practical policies targeting young people

Overview of methods

- Self report questionnaires (annual sweeps)
- Semi-structured interviews (40 undertaken in sweep 2)
- School, social work, children's hearings records (annual sweeps)
- Teacher questionnaires (1999)
- Police juvenile liaison officer and Scottish criminal records (from 2002)
- Parent survey (2001)
- Geographic information system

Participating schools

- All 23 state secondary schools
- 8 out of 14 independent sector schools
- 9 out of 12 special schools

Response Rates

- Sweep 1 - 96.2% (n=4,300)
- Sweep 2 - 95.6% (n=4229)
- Sweep 3 - 95.2% (n=4296)
- Sweep 4 - 92.6% (n=4144)
- Sweep 5 - 89.1% (n=3856)
- Sweep 6 - 80.5% (n=3525)

Research Team

- David Smith, Lesley McAra
- Susan McVie, Lucy Holmes, Jackie Palmer, Paul Bradshaw (left 2003)

Study Funding

- Economic and Social Research Council (1998 - 2002)
- The Scottish Executive (2002- 2005)
- The Nuffield Foundation (2002 - 2006)

[1] See also Smith *et al* (2001) and Smith and McVie (2003) for further details of the Study.

Context

Alcohol, tobacco and illicit drug use are widely recognised as major problems in Scotland. A recent survey of Scottish adults (Shaw *et al* 2000) indicated that around 93 per cent of men and 88 per cent of women drink alcohol at least occasionally, and almost 1 in 3 men and 1 in 6 women regularly exceed the recommended weekly consumption limits. The same survey found that 34 per cent of Scottish adults smoked cigarettes, with 14 per cent of men and 11 per cent of women considered to be 'heavy' smokers[2].

While illicit drug use is less common than drinking alcohol or smoking, recent evidence suggests that prevalence of drug use in Scotland is increasing, especially amongst young people. The Scottish Schools Adolescent Lifestyle and Substance Use Survey (SALSUS) carried out in 2002 found that 33 per cent of 15 year-olds had used drugs in the last year (Currie *et al* 2003), which compares to around 23 per cent in the late 1980s and only 10 per cent in the 1970s (Plant 1992). Patterns of drug use also differ dramatically by age. The 2003 Scottish Crime Survey found that whilst only 9 per cent of all Scottish adults (aged 16 to 59) had used illicit drugs in the last year, this figure was as high as 24 per cent amongst 16 to 19 year olds and 28 per cent for 20 to 24 year olds (McVie *et al* 2004).

The Scottish government's concern about substance misuse has been acknowledged through the publication of a number of policy and consultation documents which set out key strategies to tackle these three problematic health behaviours amongst the Scottish population. The UK-wide white paper 'Smoking Kills' published in 1998 was instrumental in informing the subsequent anti-smoking strategy in Scotland, including programme, service and policy development. Yet according to a recent report, "smoking remains the biggest single cause of preventable illness and premature death in Scotland" (NHS Health Scotland and ASH Scotland 2003). Increasing concern about the public health impact and costs of tobacco smoking has resulted in the recent implementation of a Tobacco Control Action Plan overseen by a Ministerial Working Group (Scottish Executive 2004).

Similarly, alcohol misuse was labelled one of the most serious health and social issues in Scotland in a series of documents issued by the Scottish Office in 1989 and 1992, which was followed by the publication of the Sensible Drinking Report in 1995. Ongoing concern prompted the Scottish Office to establish an Action Plan Working Group in 1997 to further examine the extent and nature of alcohol misuse in Scotland. Following a considerable period of investigation and consultation (see for example Lancaster and Duddleston 2002; Potter 2002; Sewell 2002; Reid Howie Associates 2001) the government launched a national *Plan for Action on Alcohol Problems* in January 2002 (Scottish Executive 2002a), followed in September of the same year by a service framework document aimed at helping practitioners to plan, commission and manage support and treatment services for the Scottish public (Scottish Executive 2002b).

During the last decade, the most significant policy interest has focused on drug use (Scottish Affairs Committee, 1994; Scottish Office, 1994, 1998, 1999a). The UK

[2] Heavy smokers were defined as smoking 20 or more cigarettes per day.

government's 10 year strategy for tackling drug misuse was published in April 1998, however, Scotland produced its own strategy document *Tackling Drugs in Scotland: Action in Partnership* in March 1999 (Scottish Office, 1999b). A primary focus of this strategy document is to address substance use amongst young people by helping "young people resist drug misuse in order to achieve their full potential in society" and a key UK objective is to "reduce the proportion of people under 25 reporting use of illegal drugs in the last month and previous year" (Scottish Office, 1999b).

Since this strategy was introduced, approximately £100 million has been allocated to tackle the problem of drug use in Scotland; the country has seen a proliferation of initiatives set up to address prevention, treatment and rehabilitation, including the establishment of Drug Action Teams; and a variety of policy documents reporting on the government's progress in this area have been published (Scottish Executive, 2000, 2001; Scottish Parliament, 2000). To support the evidence based approach of the Executive, a wide range of statistical data have been collected and research studies have been commissioned, focusing on the prevalence, health impact and criminal justice aspects of drugs misuse.

All of these strategies make particular reference to addressing the problem of substance use amongst Scotland's young people, although policy continues to be largely focused on smoking, drinking and drug use as separate issues. An important strand of research on adolescent substance misuse, however, focuses on the inter-relationship between each of the three substances - alcohol, tobacco and illicit drugs – and a number of studies have identified strong links between the use of one substance and the concomitant use of one or two others (Everett *et al* 1998; Best *et al* 2000; Wadsworth *et al* 2004).

Using longitudinal data from the Edinburgh Study of Youth Transitions and Crime, this findings paper examines sequences and patterns of substance use over time and how this affects the inter-relationship between the substances and multiple substance use behaviour. The paper concludes with a general discussion of the issues raised and makes some recommendations for government policy.

Structure of the report

The first part of this findings paper examines the extent of substance use amongst the Edinburgh Study cohort from sweeps one to four of the study (covering the period when the cohort were aged on average 12 to 15), describing the trends in prevalence and frequency of substance use in the early teenage years and focusing particularly on gender differences.[3] The second part examines the various inter-relationships between alcohol, tobacco and illegal drug use and tracks the most common sequences of substance use. Part three looks at some of the key characteristics of four different substance user sub-groups (differentiated by variety of substance use) and examines the extent to which these characteristics are predictive of greater involvement in substance abuse. The paper concludes with a brief review of the key findings from this analysis and presents some broad policy implications.

[3] Analysis in this paper is restricted to those who responded at all four sweeps of the study (n=3837).

PART 1: PREVALENCE OF SUBSTANCE USE

Prevalence of smoking cigarettes

At each sweep of the Edinburgh Study, respondents were asked about their frequency of cigarette smoking as shown in panel 1 (anyone who had not smoked a whole cigarette was treated as a non-smoker). Although the question asked at sweep one differed from that used at later sweeps, it is useful to include the data from this sweep as a point of reference.

Panel 1: Questions on smoking cigarettes

Sweep one

Which of these statements best describes you?

- I have never tried a cigarette (not even a puff)
- I have tried smoking cigarettes, but I don't smoke now
- I smoke cigarettes, but less than once a week
- I smoke cigarettes at least once a week
- I smoke cigarettes every day

Sweeps two to four

How often do you smoke now?

- Every day
- At least once a week
- At least once a month
- Hardly ever/never

Figure 1 shows the prevalence and frequency of smoking from age 12 to 15. One in six (16 per cent) 12 year olds said they had at least tried smoking a cigarette at some point in their lives, although only 2 per cent said they smoked on a regular basis, with less than 1 per cent being daily smokers.[4] The proportion of regular smokers rose to 8 per cent at age 13, half of whom reported being daily smokers. The most significant shift in smoking behaviour was reported at age 14, at which point the proportion of daily smokers increased three-fold to 12 per cent. At age 15, there was another increase in the proportion of daily smokers, to 17 per cent, although the prevalence of non-smoking remained reasonably stable.

The data presented in figure 1 shows the aggregate shifts in smoking behaviour from age 12 to 15, but it does not illustrate the changes in individual behaviour over that time period. Looking at the data longitudinally, 46 per cent of cohort members consistently reported being non-smokers during the four sweeps of data collection. Amongst the smokers, two thirds said they had smoked at one (30 per cent) or two (31 per cent) sweeps only, while a quarter (23 per cent) had smoked at three sweeps and 16 per cent reported smoking at all four sweeps. There was strong evidence that early experimentation resulted in behavioural continuity, since of those who had smoked by the age of 12, 66 per cent were still smoking at age 13 and 79 per cent were still smoking at ages 14 and 15. Similarly, of those who said they were daily smokers at age 12, the majority were still daily smokers at ages 13 (56 per cent), 14 (78 per cent) and 15 (70 per cent).

[4] 'Regular' smokers are defined as those who said they smoked 'every day' or 'at least once a week'.

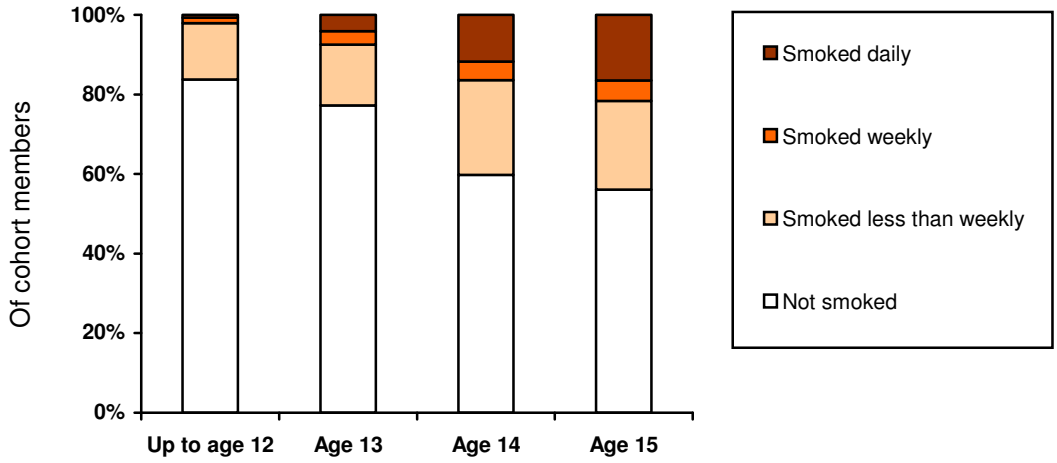

Figure 1: Prevalence and frequency of cigarette smoking, by age

Gender differences in smoking cigarettes

At age 12, smoking behaviour amongst boys and girls was strikingly similar in terms of both prevalence and frequency. However, girls were significantly (p<.001) more likely to report smoking than the boys as they got older. Figure 2 shows the increase in the proportion of boys and girls who reported being daily smokers and the concomitant decline in non-smokers between age 12 and 15. Despite the strong similarity in behaviour at age 12, the gender gap increases at each successive sweep to age 15. Longitudinal analysis showed that girls were significantly more likely (61 per cent) to have smoked than boys (48 per cent) at any point in their lives up to the age of 15. Furthermore, girls were more likely to have reported smoking at three or four sweeps than the boys (42 per cent and 37 per cent, respectively; p<.001).

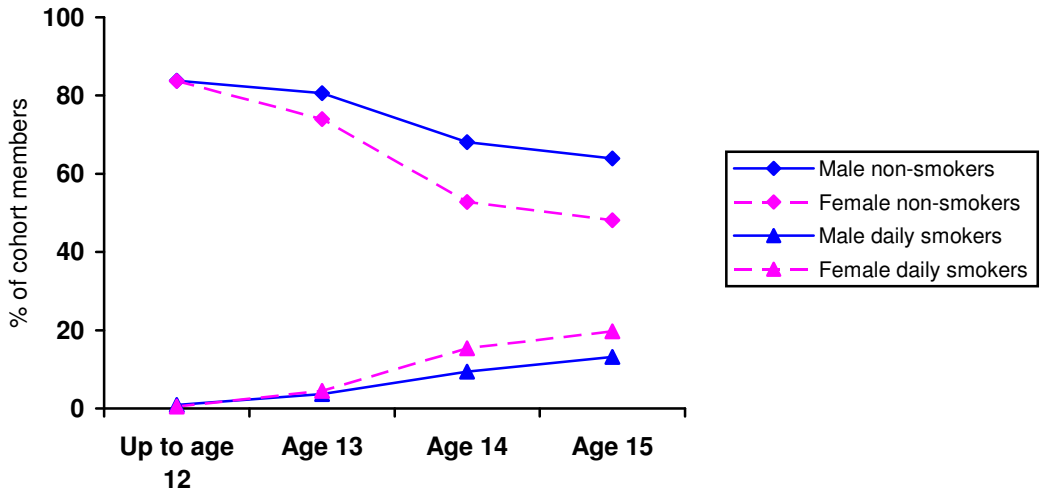

Figure 2: Prevalence of non-smoking and daily smoking, by age and gender

Prevalence of drinking alcohol

As with smoking, respondents were asked about how often they drank alcohol as shown in panel 2 (anyone who had not drunk a whole glass, can or small bottle of alcohol was treated as a non-drinker). Again, the question used at sweep one was slightly different from those at later sweeps, but the categories can be collapsed to be broadly comparable with later sweeps.

Panel 2: Questions on drinking alcohol

Sweep one

Which of these statements best describes you?

- I have never tried an alcoholic drink (not even a sip)
- I have tried drinking alcohol, but I don't drink now
- I drink alcohol, but only on special occasions
- I drink alcohol, but less than once a month
- I drink alcohol at least once a month
- I drink alcohol at least once a week

Sweeps two to four

How often do you drink alcohol now?

- At least once a week
- At least once a month
- Only on special occasions
- Hardly ever/never

Drinking alcohol was more common than cigarette smoking amongst the Edinburgh Study cohort, as illustrated in figure 3 which shows the prevalence and frequency of alcohol consumption from age 12 to 15. Already by age 12, almost half (45 per cent) of the cohort admitted that they had drunk a whole alcoholic drink at least once. For the majority this had occurred only on special occasions (such as Christmas or New Year celebrations), although one in twenty respondents reported themselves to be regular drinkers[5] and just over 1 per cent said they were weekly consumers of alcohol. At age 13, the proportion of non-drinkers fell only slightly, but amongst those who reported drinking there was a four-fold increase in the prevalence of regular alcohol use with 10 per cent drinking at least monthly and 6 per cent on a weekly basis. As with smoking, the most dramatic shift in drinking behaviour occurred at age 14, with a large drop in the proportion who had not drank alcohol in the last year and substantial rise in the prevalence of both weekly (17 per cent) and monthly (20 per cent) alcohol use. Prevalence of regular alcohol use increased further at age 15, with half of the cohort drinking alcohol either weekly (24 per cent) or at least monthly (25 per cent).

[5] Regular drinkers are defined as those who said they drank 'at least once a week' or 'at least once a month'.

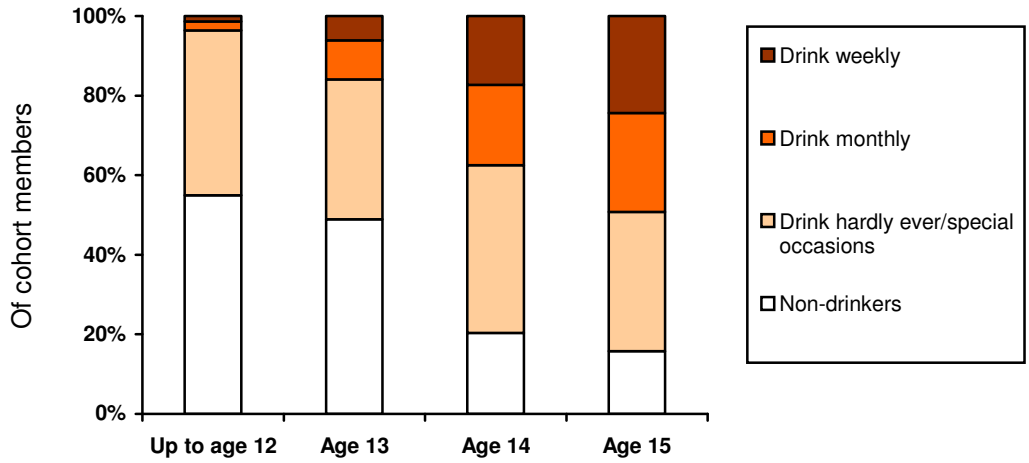

Figure 3: Prevalence and frequency of alcohol consumption, by age

Once again, a longitudinal look at the data reveals more detailed information about the drinking behaviour of individuals. A staggering 91 per cent of all cohort members revealed that they had drunk at least one whole alcoholic drink by the age 15. Of these, only 12 per cent reported drinking alcohol at just one sweep of the study, while a further 26 per cent said they had consumed alcohol at two of the four sweeps. Almost a third (29 per cent) of all drinkers stated that they had drunk at least one alcoholic drink at three sweeps of the study. However, the greatest proportion (34 per cent) stated that they had consumed alcohol at all four sweeps. As with smoking, early experimentation with alcohol precipitated a high degree of continuity over time. Of those who had drunk alcohol by the age of 12, 74 per cent reported drinking at age 13 and over 90 per cent were still drinking at ages 14 and 15. Similarly, of those who said they were weekly drinkers at age 12, over half of them were still weekly drinkers at age 13 (51 per cent), 14 (59 per cent) and 15 (51 per cent).

Adverse effects of drinking alcohol

Reporting information about the frequency with which individuals consume alcohol is valuable, but it does not indicate the extent to which drinking alcohol has adverse consequences on the respondents' lives. In order to measure the possible adverse effects, a scaled down and slightly altered version of the Rutgers Alcohol Problem Index (RAPI) was included in the questionnaire at sweep 4 (White and Labouvie 1989). In full, the 23-item RAPI is used as a screening tool for assessing adolescent problem drinking. Space restrictions did not allow for the inclusion of the full instrument in the Edinburgh Study questionnaire; instead a seven-item instrument was constructed, tested and validated (see panel 3 below).

Panel 3: Shortened RAPI to measure the adverse effects of drinking alcohol

In the last year, how many times have these things happened to you while you were drinking alcohol or because you had been drinking alcohol?

- I got into fights or caused trouble
- I spent too much money on alcohol
- I missed a day (or part of a day) at school
- I tried to cut down or stop drinking
- I can't remember some of the things I did
- A friend or family member told me to stop or cut down on my drinking
- I was so drunk I felt sick or dizzy or fell over

Response options: never, once or twice, 3 or 4 times, 5 times or more.

Table 1 presents the reported adverse outcomes for those who reported drinking alcohol at sweep 4 of the study. For most of these measures, the majority of drinkers reported that they had not suffered an adverse outcome during the course of the last year. However, for a substantial minority, alcohol consumption had had some recognised adverse effect on their behaviour or lives, and this effect was extreme for a very small proportion of respondents. Around a quarter of drinkers had been involved in fights or troublemaking at least once as a result of their drinking and around a third admitted spending too much money on alcohol. Around 1 in 10 drinkers had missed school at least once, a sizeable proportion on five or more occasions. The problematic nature of their drinking behaviour was so bad for around a fifth that they had tried at least once to cut down on or stop their drinking altogether; while others stated that a friend or family member had advised them to do so.

Table 1: Prevalence of adverse effects after drinking alcohol at sweep four

Row percentages

Per cent of 15 year olds who drank alcohol in last year (n=3196)	**Never**	**Once or twice**	**3 or 4 times**	**5 times or more**
I got into fights or caused trouble	73	20	4	3
I spent too much money on alcohol	67	23	6	5
I missed a day or part of a day at school	88	7	2	3
I tried to cut down or stop drinking	80	14	3	3
I couldn't remember some of the things I had done	51	31	10	8
A friend or family member told me to stop or cut down on my drinking	86	9	3	3
I was so drunk I felt sick or dizzy or fell over	54	26	10	10

Note: Rows may not total 100% due to rounding.

The most commonly reported adverse effects were the more immediate physiological consequences of drinking. Around a half said they couldn't remember some of things they had done after drinking, and a similar proportion admitted to being so drunk in the last year that they had been sick, dizzy or fallen over. This figure represents a slight increase from sweep 2, at which point 40 per cent of all drinkers admitted to being drunk at least once. There was, however, a bigger increase in the proportion

who reported being drunk five times or more which rose from 5 per cent at sweep 2 to 10 per cent at sweep 4.

Gender differences in drinking alcohol

In simple prevalence terms, boys were significantly ($p<.001$) more likely to start drinking at an earlier age, with 50 per cent saying that they had drunk alcohol by the age of 12 compared with 41 per cent of girls. By age 13, the girls had caught up and there was no significant difference in the proportion of boys (52 per cent) and girls (51 per cent) who reported drinking alcohol during the last year. Thereafter, girls were significantly more likely ($p<.01$) to report drinking alcohol during the last year at ages 14 (82 per cent) and 15 (88 per cent) than the boys (78 per cent and 81 per cent, respectively).

A similar pattern emerged in terms of frequency of alcohol consumption, as shown in figure 4. Boys were more likely ($p<.01$) to drink alcohol every week than girls at age 12, but there was no gender difference at age 13 or 14 and the girls actually overtook the boys at age 15, with 27 per cent of girls saying they consumed alcohol at least once a week in comparison with 22 per cent of boys ($p<.01$).

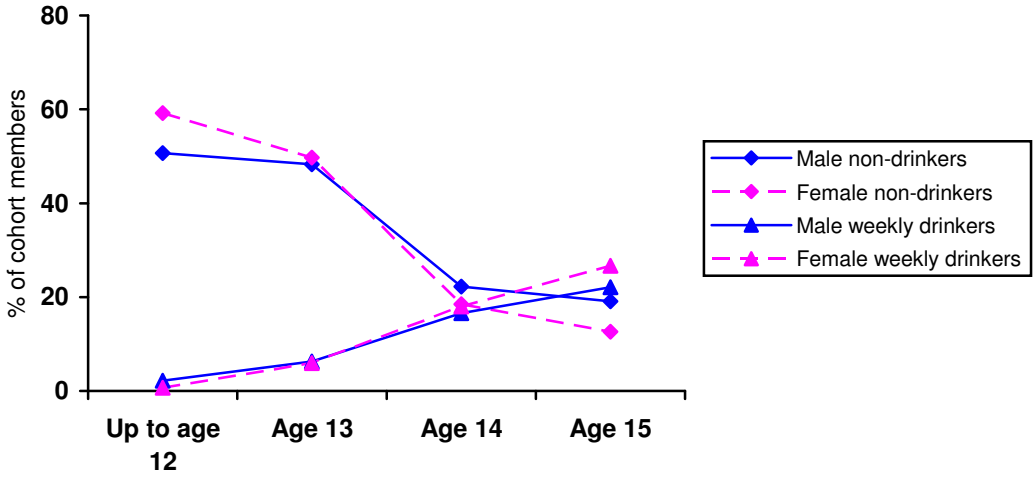

Figure 4: Prevalence of non-drinking and weekly drinking, by age and gender

Despite these shifts in behavioural patterns over time, girls and boys were just as likely to report that they had drunk alcohol at all over the four sweeps of the study (92 per cent compared with 90 per cent, respectively); and there was no difference in the number of sweeps of the study at which boys and girls had reported drinking (58 per cent of boys said they had drunk alcohol at 3 or 4 sweeps compared with 57 per cent of girls, for example).

Prevalence of illicit drug use

Essentially the same question was asked at each of the four sweeps about illicit drug use, although the time period was slightly different as shown in panel 4. Those who said they had taken or tried a drug were routed towards a list of specific drugs and asked how often they had used each of them. Volatile substances (glue, gas or solvents) were included in the list of 'drugs' rather than asked about separately and, for ease of exposition, the term 'drug use' refers to both drug and volatile substance use throughout this report.

Panel 4: Questions on drug use

Sweep one

Have you ever tried an illegal drug (that includes sniffing gas or glue)?

Sweeps two to four

During the last year, did you take or try any illegal drugs (that includes sniffing gas or glue)?

(If yes) How often have you tried each of these drugs?

- Cannabis
- Glue, gas or solvents
- Ecstasy
- Cocaine
- Speed
- Heroin
- LSD
- Magic mushrooms
- Downers
- Poppers
- Something else

Response options: never, once, 2 or 3 times, 4 times or more

Prevalence of illicit drug use was far lower than for smoking and drinking, but displayed a similar increase in occurrence as the cohort got older. At age 12, 6 per cent of respondents reported that they had used an illegal drug or solvent at least once in their lives; rising slightly to 7 per cent at age 13. As with both smoking and drinking behaviour, the most dramatic rise in prevalence of drug use occurred between ages 13 and 14, during which time a fifth (20 per cent) of respondents reportedly took either an illegal drug or some kind of solvent. This was followed by another significant rise in prevalence to almost a third (31 per cent) at age 15. Over the course of the four sweeps, 37 per cent of respondents stated that they had taken a drug at least once. Of the users, exactly half reported doing so at just one sweep, while a further 34 per cent had taken a drug at two of the four sweeps. Only 5 per cent of cohort members reported taking a drug at all four sweeps of the study.

Types of drugs used

The most commonly reported substances, overall, were cannabis and volatile substances, although there were dramatic changes in prevalence over time for both of these substances. Figure 5 shows the general change in patterns of drug use over the course of the four sweeps amongst those who reported using drugs at least once at each sweep. This graph focuses on the proportion of drug users who reported taking

cannabis, volatile substances or some other drug at each sweep, since the numbers in each of the other categories were very small.[6]

At age 12, glue, gas or solvent use was the most commonly reported form of substance use amongst the cohort, with 71 per cent of users saying they had taken volatile substances compared with 45 per cent taking cannabis and 20 per cent some other kind of drug. Thereafter, the prevalence of volatile substance use declined markedly amongst the drug users and by age 15 was reported by only 16 per cent of users. Conversely, cannabis use increased sharply between age 12 and 13, and continued to rise steadily thereafter. By age 15, 97 per cent of drug users reported using cannabis within the last year. The use of other types of drug also increased steadily between age 12 and 15, overtaking volatile substance use at age 15, although prevalence remained far lower than for cannabis. At ages 14 and 15, a third (33 per cent) of drug users reported using other kinds of drug.

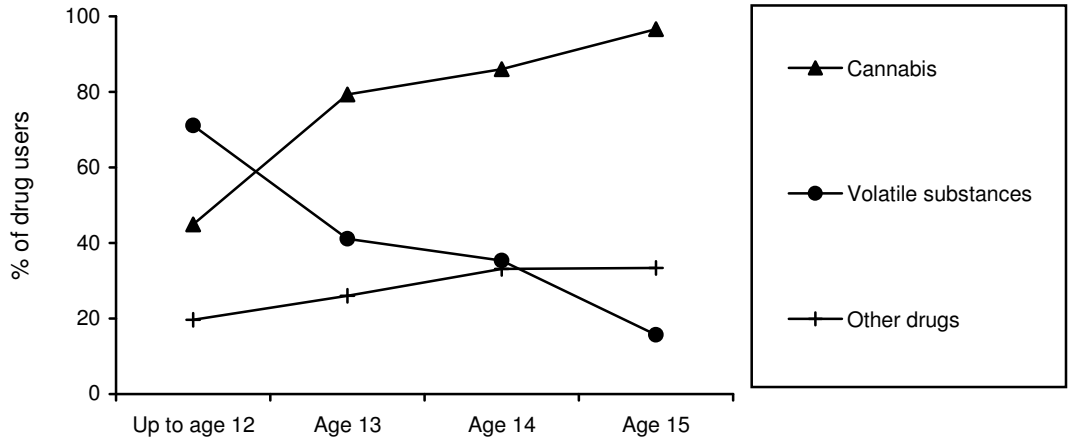

Figure 5: Prevalence of cannabis, volatile substances and other drug use amongst drug users, by age

The biggest increases in drug use were observed between age 13 and 14, at which point the prevalence of all drug types rose by at least two times. Reported use of 'ecstasy' (MDMA) increased by six times and use of 'poppers' (amyl nitrite) increased by 24 times (see table A1 in Appendix 1 for details of prevalence for all drug types). The most commonly reported 'other' drugs overall at age 14 and 15 were magic mushrooms, poppers, 'speed' (amphetamine) and ecstasy, all of which were taken by around one in ten drug users. The rising trend in cannabis use is clear from both figure 5 and table A1, but it is interesting to note that although volatile substance use declined markedly as a proportion of all users in figure 5, the percentage of cohort members who reported taking it (shown in table A1) actually increased between age 13 and 14 and dropped only slightly at age 15.

Many drug users reported taking more than one type of drug or substance at each sweep of data collection. In fact, the average 'variety' or number of types of drugs which were reportedly taken was 1.5 at age 12, rising to just under two at each of the subsequent sweeps. As can be seen from table 2, the majority of users at each sweep reported taking only one type of substance. However, a significant minority had ex-

[6] Respondents are represented more than once if they took more than one type of illicit drug.

perimented with 2 or more types of substance and the likelihood of doing so increased with age.

Table 2: Variety of drug use amongst drug users, by age

Column percentages

Number of types of drugs taken	Age 12 (n=187)	Age 13 (n=241)	Age 14 (n=652)	Age 15 (n=1048)
One	73	66	60	64
Two	14	20	19	19
Three	6	5	10	7
Four	3	2	5	3
Five or more	4	7	7	8

Note: column percentages may not total 100 due to rounding.

In terms of the actual number of times drugs were reportedly taken, a conservative minimum can be estimated by totalling the responses given to the question on how many times they had taken each type of drug (assigning a value of 2 for those who had taken a substance '2 or 3 times'; and a value of 4 for those who reported taking drugs '4 times or more')[7]. This produces an average drug use frequency of 3 times for drug users at ages 12 and 13; and an average of 4 times for those at ages 14 and 15. Although most drug users had taken only one substance, few respondents admitted to using a substance on only one occasion, as can be seen in table 3. Two in five drug users said they had only experimented with drugs once up to age 12, but this proportion had halved by age 15. Correspondingly, one sixth of users said they had used drugs five times or more up to age 12, but this doubled to almost one in three by age 15. Bearing in mind that this frequency measure is based on a 'minimum estimate' of the real figure, the level of drug use amongst the persistent drug users may be considerable and shows definite signs of rising as they get older.

Table 3: Frequency of drug use amongst drug users, by age

Column percentages

Number of times used drugs	Age 12 (n=187)	Age 13 (n=241)	Age 14 (n=652)	Age 15 (n=1048)
Once	39	29	22	18
Twice	27	24	20	20
Three times	3	10	6	3
Four times	16	19	24	30
Five times or more	16	19	29	30

Note: column percentages may not total 100 due to rounding.

Although the prevalence of drug use varied considerably by drug type (with cannabis and volatile substances being by far the most commonly reported), frequency of drug use varied far less (see table A2 in Appendix 1 for details on all drug types). There was evidence of an increase in both frequency and prevalence for some drug types, such as cannabis, speed and heroin. Considerable stability was evident in the frequency of use of other drug types, despite changing levels of prevalence. For exam-

[7] The limitations of this method must be noted in terms of trying to estimate a realistic count of drug taking incidents amongst the cohort. However, such a frequency measure is a useful tool for distinguishing amongst the very occasional and the more problematic drug users.

ple, the average frequency of volatile substance, magic mushrooms and cocaine use remained constant at all sweeps despite an increase in prevalence over the same period. Although the number of respondents who reported taking some of these drug types is small, such detailed analysis reveals that there are complex and intricate patterns of drug use at both the individual level and the individual drug level.

Gender differences in illicit drug use

Patterns of drug use amongst boys and girls were very similar. Figure 6 shows that boys were slightly more likely to report taking drugs at each sweep at age 12 ($p<.01$) and age 13 ($p<.001$), although there was no difference at ages 14 and 15. There was also no difference in the proportion of boys and girls who had reported using a drug at any point over the four sweeps. Amongst the drug users, boys were more likely ($p<.01$) to have used drugs at three (13 per cent) or four (6 per cent) sweeps than girls (10 per cent and 3 per cent, respectively).

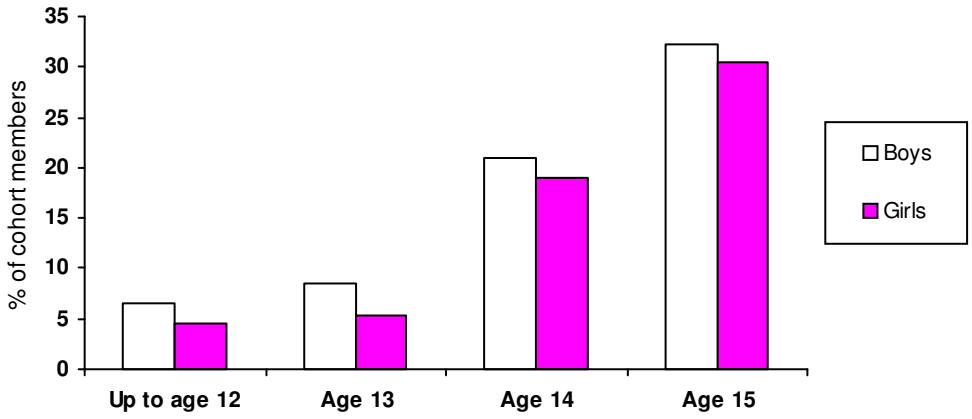

Figure 6: Prevalence of drug use, by age and gender

There was some slight gender difference in the types of drugs used. Amongst the drug users, boys were more likely ($p<.01$) to have used cannabis up to age 12 than girls (55 per cent compared with 31 per cent, respectively), but thereafter girls and boys were equally likely to use cannabis. Girls, on the other hand, were more likely to report using volatile substances than the boys up to age 12 ($p<.01$) and at age 15 ($p<.001$). There was no significant gender difference in the use of other types of substance. Similarly, there was little difference in the variety of drugs used or the frequency of drug use. At age 12, boys were more likely than girls ($p<.05$) to report using more than one type of drug (1.7 and 1.3, respectively) and to use drugs on more than one occasion (3.3 compared with 2.3, respectively); thereafter, there was no significant difference.

Substance use age of onset

In his analysis of the 1998/99 Youth Lifestyles survey data, Pudney (2002) demonstrated that there were distinct ages of onset for particular types of substances. He found that alcohol, tobacco and volatile substances had the earliest age of onset, at around age 14. Drugs such as cannabis and poppers had a mean onset age of around 16; harder drugs, such as heroin, LSD, magic mushrooms and amphetamines started later at around 17 or 18 years; while ecstasy and cocaine had the highest mean age of onset at almost 20. Unfortunately, such detailed analysis is not possible within the context of this report since only four sweeps of data are presented here, so onset later than age 15 cannot be determined. It is possible to make reliable estimates about mean age of onset for smoking and drinking, but data from later sweeps will be required to identify the mean age of onset for the various drug types.

It is possible to look at the distinct patterns of age of onset of cigarette smoking, alcohol consumption and drug taking generally amongst the Edinburgh Study cohort up to age 15. Figure 7 shows the cumulative age of onset for each of the three substance types. Retrospective information was collected at age 12 on the age at which each substance had first been used, going back to 'age 8 or under'. This chart demonstrates quite clearly the dominant position of alcohol in terms of adolescent experimentation, with tobacco being the second most commonly used substance and illicit drugs (or volatile substances) being far less commonly used. Nevertheless, the trends in terms of increasing use with age are quite clear for all three substance types.

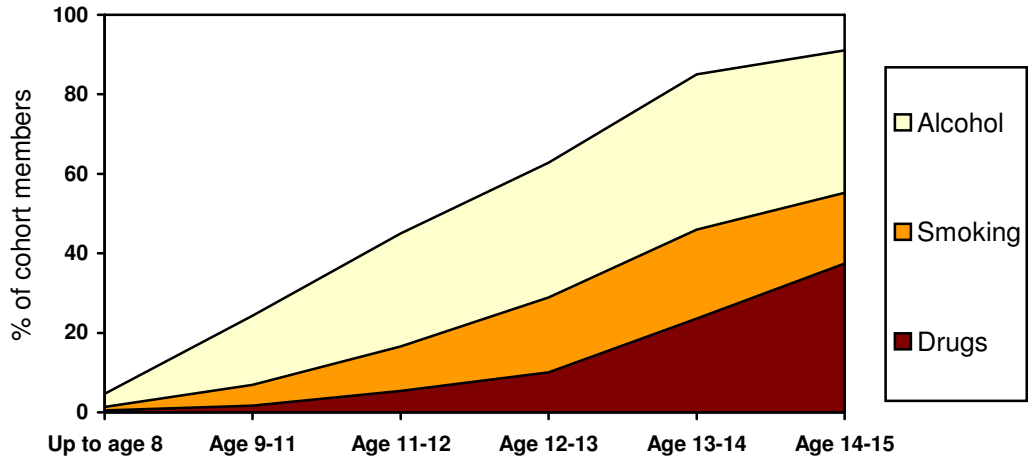

Figure 7: Age of onset of smoking, drinking and drug use

The rate of drinking onset shows a much steeper incline from age 8 up to age 14 than that for either smoking or drug use. Nevertheless, drinking and smoking appear to share a common peak age of onset between 13 and 14 years of age, whereas the age of onset for drug use has clearly not yet peaked by age 15 amongst this cohort. A quarter (24 per cent) of all drinkers, just under a third (31 per cent) of all smokers and just over a third (36 per cent) of all drug users said they consumed their first whole alcoholic drink, smoked their first whole cigarette or used their first drug between the ages of 13 and 14. This age appears to mark a significant turning point in young people's lives in terms of problematic health behaviours.

After age 14, the rate of onset of both drinking and smoking declined markedly, with only 7 per cent of drinkers and 17 per cent of smokers starting their respective habits between ages 14 and 15. This is hardly surprising in the case of drinking, since the majority of young people had already reported starting to drink before this age. However, it does suggest in the case of smoking that experimentation is starting to tail off by around age 15. Conversely, 37 per cent of drug users reported using their first drug between age 14 and 15, so clearly the age of initial experimentation is considerably higher for illicit drugs. These findings are broadly in line with those of Pudney (2002).

Two thirds (69 per cent) of drinkers and half (52 per cent) of the smokers in the cohort said they had started their respective habit at age 13 or under. Amongst the cohort as a whole, this means that 63 per cent of them had drunk a whole alcoholic drink and 29 per cent of them had smoked a whole cigarette by the age of 13. Age of onset for drug use was generally higher, but nevertheless around a quarter (27 per cent) of drug users (10 per cent of the cohort) said they had tried a drug or volatile substance by age 13. More worryingly, 27 per cent of all drinkers (24 per cent of the cohort) reported that they had drunk their first whole alcoholic drink at age 10 or under. This compares with 13 per cent of smokers (7 per cent of cohort members) who said they started smoking at age 10 or under and 5 per cent of drug users (under 2 per cent of the cohort) who started using drugs at this age. This shows that a significant minority of young people start to use substances at a very early age and, on the basis of longitudinal evidence, these individuals have a high likelihood of continuing to do so.

Gender differences in age of onset

Although smoking was more prevalent amongst the girls as a whole, it was the boys who reported starting to smoke at the earliest age bands, with 17 per cent of male smokers starting at age 10 or under compared with 10 per cent of female smokers. Nevertheless, girls were equally likely as boys (18 per cent) to start smoking at ages 11 and 12, and thereafter were more likely to start smoking between ages 12 and 14. Similarly, onset of drinking was much earlier amongst the boys than the girls, with 31 per cent of male drinkers starting at age 10 or under compared with 23 per cent of female drinkers. There was no difference in the proportion of male and female drinkers who started consuming alcohol between the ages of 11 and 13, but girls were more likely to start drinking than boys after age 13. Age of onset of drug use was high for both boys and girls, with the majority of both sexes reporting taking their first drug between ages 13 and 15, but there was no gender difference in the age of onset.

PART 2: RELATIONSHIPS BETWEEN ALCOHOL, TOBACCO AND ILLICIT DRUG USE

Part one of this report shows quite distinct differences in the patterns and trends of tobacco smoking, alcohol consumption and drug use amongst the Edinburgh Study cohort. However, the high prevalence figures for each indicate that there must be a large degree of overlap between the three substance types. This part of the report examines the inter-relationships between these three forms of substance use and explores developmental sequences in the progression of one level or type of substance use to another. Analysis in this section is largely focused on those who were classed as 'regular' users (i.e. those who smoked at least once a week, drank alcohol at least once a month or had either taken more than one type of drug or had used drugs on at least four occasions).

Individual cohort members were classified according to which types of substance they reported using, providing eight categories in all for analysis. By far the biggest category at each sweep was the 'non-users' (i.e. those who either had not used any of the three substances, or had done so but not frequently enough to be defined as a regular user). The proportion of cohort members in some of the other categories was very small, particularly at the first sweep (see table A3 in Appendix 1 for an exact breakdown of the figures). Therefore, figure 8 presents the prevalence levels for four main user sub-groups: those who reported being non-users (including non-regular users); those who reported being regular users of a single substance only; those who said they regularly used two substances; and those who reported regular use of all three substances.

Two obvious general trends are evident from figure 8. First, in line with the general trends for each type of substance, the prevalence of non-regular substance users declined markedly over time, from 94 per cent at age 12 to 46 per cent at age 15. Second, the proportion of cohort members reporting regular single or multiple substance use increased concurrently 8, and had possibly not yet peaked by age 15.

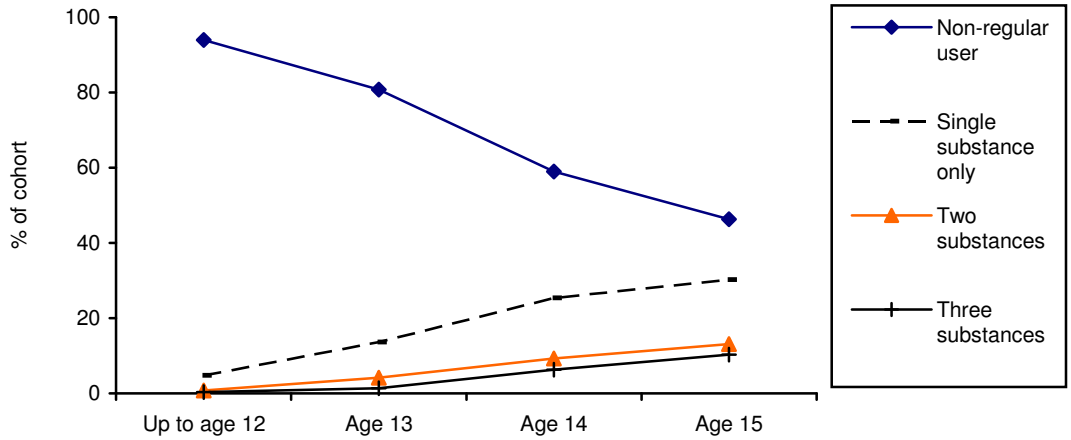

Figure 8: Prevalence of substance use by user sub-group

The single substance users predominantly consisted of those who drank alcohol at least once a month, with smokers and drug users being far less likely to fall into this group. The single substance sub-group accounted for only 3 per cent of cohort members up to age 12 but increased steadily to 26 per cent by age 15. Less than one in twenty cohort members reported being regular smokers only at any of the four sweeps, while only one per cent or less said they were drug users only. The proportion of cohort members who reported using two or three substances was considerably smaller than the number of single users, but clearly they represent a problematic group. There was very little difference in the proportion of those who were regular two-substance users (whatever the combination) and those who had reported using all three substances on a regular basis. Table A3 (in Appendix 1) shows in more detail the increases in prevalence at each age band for the various combinations of multiple substance use, although those who reported taking all three substances showed the greatest increase, from less than one per cent of the cohort at sweep one to 10 per cent at age 15. There was least increase in the group who smoked and took drugs only.

Alcohol and tobacco

The proportion of cohort members who reported regular drinking and smoking rose from less than one per cent at age 12 to 16 per cent at age 15. Looking in more detail at the habits of individual substance users reveals a very strong association between tobacco and alcohol use. Table 4 shows the proportion of smokers at each age band who reported being regular, occasional or non-drinkers; and, conversely, the proportion of regular drinkers who reported being regular, occasional or non-smokers. At a glance, it is evident that regular smokers were more likely to report drinking, on either a regular or occasional basis, than regular drinkers were to report smoking. Nevertheless, the tendency to partake regularly of both substances increased with age. The age effect was strongest amongst the smokers, illustrated by an increase in the proportion of regular smokers who were also regular drinkers from around a third at age 12 to four fifths by age 15. Amongst the regular drinkers there a more modest increase in prevalence of regular smoking from around one fifth at age 12 to one third at age 14, before declining at age 15.

Table 4: Inter-relationship between alcohol and tobacco

Row percentages

	% regular drinkers	% occasional drinkers	% non-drinkers
Of the regular smokers:			
Up to age 12	33	54	13
At age 13	57	28	15
At age 14	76	19	5
At age 15	79	15	5
	% regular smokers	% occasional smokers	% non-smokers
Of the regular drinkers:			
Up to age 12	18	37	45
At age 13	27	30	43
At age 14	34	32	34
At age 15	25	29	36

Note: Rows may not total 100 due to rounding

More detailed analysis of the frequency of alcohol consumption amongst the smokers, and cigarette smoking amongst the drinkers, reveals a high degree of dose-dependence between the two substances which increases in severity with age (see tables A4 and A5 in Appendix 1 for a detailed breakdown of the figures). At age 12, 28 per cent of daily smokers reported also being weekly drinkers, compared with only 12 per cent of weekly smokers and 3 per cent of occasional smokers. By age 15, 57 per cent of daily smokers were also weekly drinkers, compared with 46 per cent of weekly smokers and only 26 per cent of occasional smokers. The reciprocal relationship is similar, although less intense. Up to age 12, 13 per cent of weekly drinkers said they smoked daily, compared with 4 per cent of monthly drinkers and less than one per cent of occasional drinkers. By age 15, this had increased such that 39 per cent of weekly drinkers were daily smokers, compared with 16 per cent of monthly drinkers and 7 per cent of occasional drinkers. In other words, there was a high degree of contemporaneous association between use of alcohol and tobacco, but regular smokers were more likely to be regular drinkers than vice versa.

Tobacco and illicit drugs

The proportion of cohort members who both smoked and took drugs rose from 0.6 per cent at sweep one to 12 per cent at sweep four. As with smoking and drinking, tobacco and illicit drug use proved to have a very strong inter-dependent effect, as shown in table 5. As would be expected smoking was more common amongst the drug users than drug use was amongst the smokers, although both demonstrated a distinct age effect. The prevalence of regular smoking amongst the drug users showed a greater increase than the rise in regular drug use amongst the smokers, although this may be to a large extent linked to the mode of drug use (since the use of cannabis would be expected to be combined with tobacco smoking in most cases).

Table 5: Inter-relationship between tobacco and illicit drugs

Row percentages

	% regular drug users	% occasional drug users	% non-drug users
Of the regular smokers:			
Up to age 12	33	14	54
At age 13	25	17	58
At age 14	43	21	36
At age 15	54	22	25
	% regular smokers	% occasional smokers	% non-smokers
Of the regular drug users:			
Up to age 12	34	41	25
At age 13	57	31	12
At age 14	68	25	8
At age 15	66	23	11

Note: Rows may not total 100 due to rounding

The definition of 'regular drug use' used here is intended to differentiate between individuals who have experimented with at least two types of illicit drug or volatile substance or who have taken it more than just once or twice. However, this is rather a crude distinction and does not really differentiate between low level and persistent

drug users. Another way of looking at the relationship between smoking behaviour and illicit drug use is to calculate the mean frequency of drug use for each of the smoker groups. Table 6 shows the average number of times that individuals within each of the smoking sub-groups reported taking drugs. Once again, there is an element of dose-dependence in the relationship between these two substances, such that increased use of one substance is associated with significantly increased use of the other. Daily smokers at the age of 12, for example, reported taking drugs on 2.2 occasions on average, increasingly significantly ($p<.001$) to 4.6 by age 15. In other words, regular smokers were not only more likely to report using drugs at all than the occasional or non-smokers but were also more likely to reporting taking drugs frequently, and this tendency increased with age.

Table 6: Mean frequency of illicit drug use amongst the smokers and non-smokers

Means

Smoking frequency	Up to age 12	Age 13	Age 14	Age 15
Daily	2.2	1.8	3.6	4.6
Weekly	1.8	1.0	2.3	2.5
Occasional	0.4	0.5	0.8	1.2
Non-smoker	*	0.1	0.1	0.3

Notes: * denotes a mean greater than 0 but less than 0.1.
Differences between daily smokers and all other groups are significant at $p<.001$.

Alcohol and illicit drugs

The proportion of cohort members who stated that they both drank and took illicit drugs increased from 0.5 per cent at age 12 to 16 per cent at age 15. As with the other substances, alcohol and illicit drug use proved to be strongly inter-connected, although drinking alcohol was far more common amongst the drug users than drug use was amongst the drinkers, as shown in table 7.

The prevalence of drug use amongst the regular drinkers was far higher than for the cohort as a whole: 50 per cent compared with 31 per cent at age 15. However, the extent of drinking amongst the drug users was far greater. In fact, hardly any of the drug users from age 13 onwards were non-drinkers, with the vast majority of them being regular drinkers.

Table 7: Inter-relationship between alcohol and illicit drugs

Row percentages

	% regular drug users	% occasional drug users	% non-drug users
Of the regular drinkers:			
Up to age 12	15	12	73
At age 13	15	11	74
At age 14	23	18	59
At age 15	30	20	50
	% regular drinkers	% occasional drinkers	% non-drinkers
Of the regular drug users:			
Up to age 12	28	63	9
At age 13	73	25	3
At age 14	84	13	2
At age 15	84	14	2

Note: Rows may not total 100 due to rounding

Once again, it is useful to differentiate between the drinking sub-groups by examining the average frequency with which they reported taking drugs (bearing in mind the different definition of regular drug use). Table 8 shows the average number of times that individuals within each of the drinking sub-groups reported taking drugs. The increasing dose-dependence of alcohol and drugs is apparent, although to a lesser extent than that of smoking and drug use (shown in table 6, above). Weekly drinkers at the age of 12 reported taking drugs on 1.5 occasions, on average, doubling ($p<.001$) to at least three incidents of drug taking during the previous year by age 15.

Table 8: Mean frequency of illicit drug use amongst the drinkers and non-drinkers

Means

Drinking frequency	**Up to age 12**	**Age 13**	**Age 14**	**Age 15**
Weekly	1.5	1.5	2.5	3.0
Monthly	0.9	0.5	1.0	1.4
Occasional	0.2	0.2	0.3	0.5
Non-drinker	*	*	0.1	0.2

Notes: * denotes a mean greater than 0 but less than 0.1.
Differences between weekly drinkers and all other groups are significant at $p<.001$.

Sequences of substance use

From the data presented above, it is clear that regular drug users are more likely to also drink and smoke regularly than the reverse position. This is likely, in part, to be due to the method of drug use itself, since most cannabis use involves smoking it together with tobacco. There may also be aspects of personality (such as increased tendency to take risks) and lifestyle factors (such as greater freedom and weaker supervision by parents) amongst the drug users which may encourage them to try other substances (this is discussed in more detail in part three of this report). Regular smokers

were also found to be more likely to drink on a frequent basis than the reverse relationship, which is contrary to the popular image of individuals who take up smoking as a consequence of their drinking behaviour. But how does this tie in with the results presented in part one of this report, which demonstrated that alcohol tended to have the earliest age of onset, followed by tobacco and then illicit drug use?

To tease out these relationships further, it is possible to analyse the temporal progression of substance using behaviour. Table 9 shows the proportion of cohort members who displayed developmental progression from occasional drinking, smoking and drug use to more regular drinking, smoking and drug use between sweeps of the study. Before interpreting these results, there are two important points which must be stressed in relation to table 9. First, the results presented do not demonstrate that occasional use of one substance 'caused' progression to regular use of that substance or another; in other words it does not provide supporting evidence for a domino effect. This table merely shows the proportion of cases in which one form of behaviour preceded another in the case of the Edinburgh Study participants. The second point that must be borne in mind is that, while we can make broad assumptions about the sequential stages in which substance use took place, the temporal nature of the data collected is not specific enough to be absolutely precise. The reference period used for sweeps two to four was 'during the last year', and at the first sweep age of first use was restricted to specified age bands of a year or more.[8] In many cases, therefore, onset of use of one substance coincided with onset of use of another within the same sweep, and these results are not displayed here. Table 9 is simply intended to give a broad indication of the developmental progression of substance use.

The results presented in part one of this report on age of onset indicated that the temporal priority for substance use was alcohol consumption followed by smoking tobacco and then drug or volatile substance use. This pattern appears to be supported by table 9, which shows that regular participation in all forms of substance using behaviour is in the vast majority of cases, preceded by occasional drinking. Intra-substance progression produced the highest probability of subsequent regular use, with 91 per cent of regular drinkers having reported occasional alcohol consumption at an earlier age and 86 per cent of regular smokers having reported prior occasional smoking. The regular drug users were the least likely to report occasional use at an earlier age, which might indicate that progression from occasional to regular drug use occurs more quickly amongst users than for drinking or smoking.

[8] The age bands used at sweep one were 'age 8 or under', 'age 9 or 10', 'age 11 or over'.

Table 9: Developmental progression of substance use

	% of regular users who reported earlier occasional use		
	Regular drinker	Regular smoker	Regular drug user
Occasional drinker	91	84	87
Occasional smoker	19	86	74
Occasional drug user	45	35	64

Note: Definition of 'regular' drinking, smoking and drug use given on page 17.

There was also a high likelihood of inter-substance progression, particularly from occasional drinking at an earlier age to regular smoking and drug use later. Regular drinking was unlikely to be preceded by occasional smoking or drug use, while regular drug use was highly likely to be preceded by the other two. In a large proportion of cases, however, development to regular use of one substance occurred simultaneously with regular use of another. For example, only 32 per cent of regular smokers said they started drinking regularly at least a year earlier, but 48 per cent reported starting to drink regularly within the same time frame. Similarly, regular drug use was preceded by regular drinking in 49 per cent of cases and regular smoking in 41 per cent of cases, but 40 per cent of regular drug users said they started drinking regularly and 47 per cent started smoking regularly at the same time as they started using drugs regularly.

In summary, for the most frequent substance users, there was a distinct sequential progression from less common usage to more common usage (particularly within substance type, but also from one substance to another). However, amongst those who had used two substances (in whatever combination) there was a common tendency for individuals to become regular users of both within the same time-span. This makes it seem likely that whatever characteristics or factors are implicit in increasing the frequency of substance using behaviour amongst early adolescents are likely to be common to all three types of substance.

PART 3: CHARACTERISTICS OF SUBSTANCE USERS

The previous two parts of this report have focused on the extent and nature of tobacco smoking, alcohol consumption and illicit drug use, and on the complex relationships and inter-dependence between the three substances. This part shall focus on the characteristics of those individuals who reported using these three substances and assess the extent to which certain key characteristics or factors can be used to predict different types of substance user. In order to maximise numbers for analysis, scrutiny of the data is restricted to the four regular user sub-groups defined in part two, namely non-users and single, double and triple substance users. Given the very small numbers in both the double and triple substance user sub-groups at sweep one, only sweeps two to four are included in the analysis for the remainder of this section.

Gender

A number of differences and similarities in the smoking, drinking and drug use patterns of girls and boys have already been outlined in part one of this report. At age 14 and 15, girls were more likely to smoke and drink and were equally likely to take drugs as the boys. In addition, however, there were quite distinct gender differences in the proportion of boys and girls who fell into each of the substance user sub-groups, as shown in table 10. At age 13, there was no significant difference; however, at ages 14 and 15 distinct differences emerge. The girls were less likely ($p<.001$) than the boys to be non-regular substance users from age 14, and more likely to be double substance users at age 14 ($p<.001$) and age 15 ($p<.05$). In addition, at age 15, the girls were more likely ($p<.001$) to say they had regularly used all three substances during the previous year.

Table 10: Substance user sub-groups by age and sex

Column percentages

	Age 13		Age 14		Age 15	
Substance user group	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
Non-users	82	80	63	49	49	43
Single substance users	13	14	24	30	30	30
Double substance users	4	4	7	12	12	14
Triple substance users	2	1	6	8	8	12

Notes: Column percentages may not total 100 due to rounding. Gender differences are significant at $p<.05$ or above.

Self-reported delinquency

There are many research studies which have shown links between the use of alcohol or illegal drugs and delinquent or anti-social behaviour (recent examples include Portman Group 2002; White *et al* 2002; Sun *et al* 2004). It is important to note that the relationship is often a very complex one, and patterns of transition and order of initiation are not always easy to determine or explain. For the purposes of this report, the analysis shall be restricted to determining whether there is an association between the two forms of behaviour and, if so, and the extent of this association within each subgroup. Two measures of delinquent behaviour are used: *variety of offending* (a count of the number of different offending behaviours the respondent had engaged in) and *volume of offending* (the cumulative frequency of offending across all the offending behaviours asked about).[9] A total of 15 items of anti-social or delinquent behaviour were used to create both of these measures (these are listed in panel 5).

Panel 5: Items of delinquency included in variety and volume measures

- Fare dodging
- Shoplifting
- Noisy or cheeky in public
- Joyriding
- Theft from school
- Carrying a weapon
- Graffiti
- Vandalism
- Housebreaking
- Robbery
- Theft from home
- Fire-raising
- Assault
- Theft from vehicle
- Truanting from school

The four substance use sub-groups were compared in terms of their mean variety and volume of self-reported delinquency at ages 13 to 15 (scores are presented in tables A6 and A7 in Appendix 1). Figure 9 shows that levels of self-reported delinquency among the Edinburgh Study cohort differed significantly between the various subgroups. There was an incremental increase in both variety and frequency of offending from the non-user group through to the multiple user group. Overall, variety and volume of delinquency appear to decline slightly with age; however, this trend is common to all four groups. The multiple substance users reported higher levels ($p<.001$) of delinquent involvement than all of the other groups, both in terms of variety and volume. At each age point, the triple substance group reported a mean score that was at least twice as high as that of the single substance group, and at least four times higher than the non-users. The scale of difference was least between the double and triple substance user groups, yet the level of statistical significance remained high ($p<.001$).

[9] For more detail about these measures see Smith and McVie 2003.

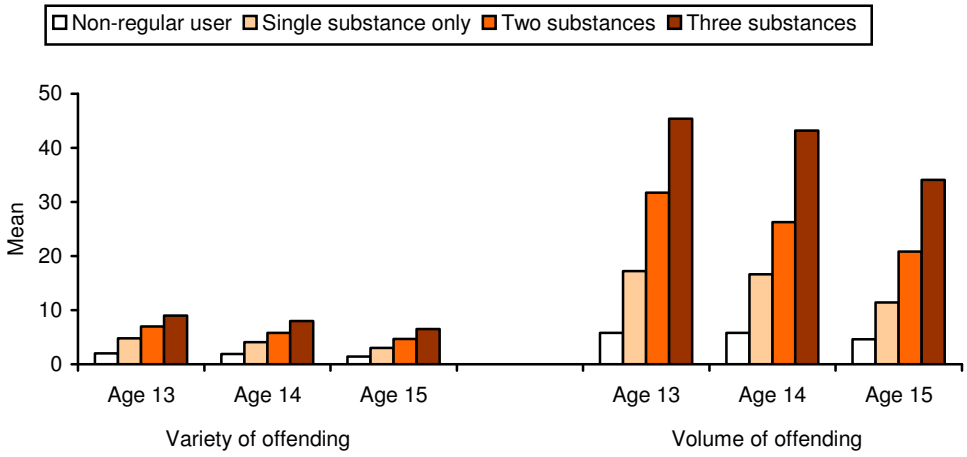

Figure 9: Mean variety and volume of offending amongst substance user sub-groups

Personality

A number of research studies have linked personality characteristics to both delinquent and problematic health behaviours. Eysenck's (1977) early work has largely been rejected on methodological grounds; however, more recently, personality theory has seen a revival thanks to longitudinal studies carried out in Dunedin and the US, although this has largely been restricted to demonstrating links between personality and self-reported delinquency. Various studies have shown there to be a strong relationship between certain personality constructs and problematic health behaviours and that people who misuse drugs and alcohol are more likely to suffer from antisocial and dependent personality disorders. Research on the latter has tended to be restricted to adults (see, for example, Grant *et al* 2004), whilst research on adolescents has more often focused on more general personality traits. Sutherland and Shepherd (2002), for example, identified a strong association between substance use, violence and low self esteem. Meanwhile, Wills *et al* (2000) found that adolescent substance use was strongly mediated by risk-taking tendencies. The Edinburgh Study questionnaires included brief personality scales measuring both self-esteem and impulsivity (panel 6, below, shows the precise questions and the sweeps at which they were used).

The self-esteem measure is a shortened version of the Rosenberg Self-Esteem Scale (Rosenberg 1965); while the impulsivity measure was adapted from the Eysenck Impulsivity Scale (Eysenck *et al* 1984). Unfortunately, the analysis for this report does not extend to sweep five (at which impulsivity was again included as an item) so a longitudinal analysis in the changing relationship between this personality characteristic and substance use cannot be conducted here. The six items from each scale were scored from 0 to 4, giving each trait a total score with a range of 0 to 24 where a high score corresponded to high self esteem or high impulsivity.[10] The four substance user sub-groups were then compared in terms of their mean personality scores for self esteem at ages 13 and 15 and for impulsivity at age 14.

[10] All three of these scales had good internal reliability, with Cronbach's alpha scores of .73 for sweep 2 self esteem, .79 for sweep 4 self esteem and .74 for sweep 3 impulsivity.

Panel 6: Personality measures used in the Edinburgh Study[11]

Self-Esteem (measured at sweeps 2 and 4)

How much do you agree or disagree with these statements?

- I like myself
- I often wish I was someone else
- I am able to do things well
- I don't think much of myself
- There are some good things about me
- There are lots of things about myself I would like to change

Impulsivity (measured at sweep 3)

How much do you agree or disagree with these statements?

- Having to plan things makes them less fun to do
- I get into trouble because I do things without thinking
- I put down the first answer that comes into my head on a test and often forget to check it later
- I get involved in things I later wish I could get out of
- I sometimes break rules because I do things without thinking
- I get so excited about doing new things that I don't think about problems that might happen

Response options: Agree a lot, agree a bit, not sure, disagree a bit, disagree a lot.

Quite interesting differences emerge for the two personality constructs across the three sweeps, as shown in table 11 where the mean scores are presented. At age 13, the non-users had a significantly ($p<.001$) higher self esteem score than any of the other sub-groups; however, there were no significant differences amongst the substance users. By age 15, an interesting shift in the relationship between substance use and self esteem had occurred. There was no significant difference between the non-users and single substance users in terms of their self esteem score, and there was no difference between double and triple substance users. However, non-users and single substance users had a significantly higher self esteem score than both the double and triple substance users. In other words, although this personality trait did little to differentiate between any of the substance users at age 13, by age 15 the multiple users were quite different from the single substance users (who were actually very like non-users).

Table 11: Mean personality scores for substance user sub-groups, by age

Means

Substance user group	Self esteem at age 13 (n=3788)	Impulsivity at age 14 (n=3789)	Self esteem at age 15 (n=3813)
Non-users	15.7	11.4	16.4
Single substance users	14.5	14.0	16.2
Double substance users	13.8	15.1	15.1
Triple substance users	13.9	15.4	14.7

[11] Both of these measures were also included at sweep one, but analysis of this sweep is not presented here.

In terms of impulsivity at age 14, the non-users had a significantly ($p<.001$) lower impulsivity score than any of the other substance user groups. The single substance users were also significantly less impulsive than the double and triple users. However, there was no significant difference between the double and triple substance users in terms of their level of impulsivity. In other words, the relationship between impulsivity and substance use amongst the regular user groups at age 14 was the same as that of self esteem at age 15, with a discrete differentiation between the single and multiple user groups (although no difference between the double and triple substance users). Nevertheless, the link between impulsivity and non-regular substance use at age 14 was more like that of the link with self esteem at age 13, where the non-substance users were quite clearly differentiated from all the other the substance user groups.

Lifestyle, peers and parenting

Social activities are a key feature of adolescence and the social context of leisure is important to adolescent development as it provides opportunities for both differentiation and integration. Unsupervised leisure activities, such as hanging around on the streets, provide opportunities for getting involved in problematic behaviour. The increasing influence of peers and diminishing power of parental authority during adolescence also play a role in determining behavioural patterns. Research from the US found a direct linear relationship between substance use and various aspects of leisure and lifestyle, including peer substance using behaviour, how much parents "really knew" about their activities and number of hours spent hanging out with friends (Caldwell and Darling 1996). While another study by Kung and Farrell (2000) found that both peer pressure and parenting practices had direct effects on drug use, with peer pressure mediating the influence of parenting.

Lifestyle

Analysis of the Edinburgh Study data on lifestyle and leisure activities can be broadly separated into two types: organised or conventional leisure activities; and unorganised or unsupervised leisure activities. Details of the questionnaire items which were put in each type are summarised in panel 7 – these items are analysed individually as the measures are quite different in terms of response options and there was insufficient internal reliability to combine them into short scales. The four substance user subgroups were, therefore, compared individually on each of these measures.

Panel 7: Types of leisure activity

Supervised or conventional leisure

- Stay at home most evenings.
- Going to organised clubs, groups or sports centres most days.
- Going shopping or out for something to eat at least once a week.

Unorganised or unsupervised leisure

- Going to amusement arcades at least once a week.
- Going to discos, nightclubs or raves at least once a week.
- Hanging around most evenings.

The prevalence of involvement in each in the three conventional or supervised leisure activities by each of the substance user sub-groups is illustrated in figure 10. Going out shopping or for meals was common at all ages and there was little or no difference amongst the groups in the extent to which they did this. Attending sports or youth clubs was another popular activity, although the triple substance users stand out as being less likely to do so than the other sub-groups at all ages. By age 15, the double substance users had joined the triple substance users as being significantly ($p<.001$) less likely to get involved in organised sports. Staying at home in the evening was not common practice amongst the cohort generally, but it yielded the greatest difference across the four sub-groups. The non-users were the most likely of all the groups ($p<.001$) to stay at home most evenings and the likelihood of staying in significantly diminished with increased variety of substance use at all three age bands.

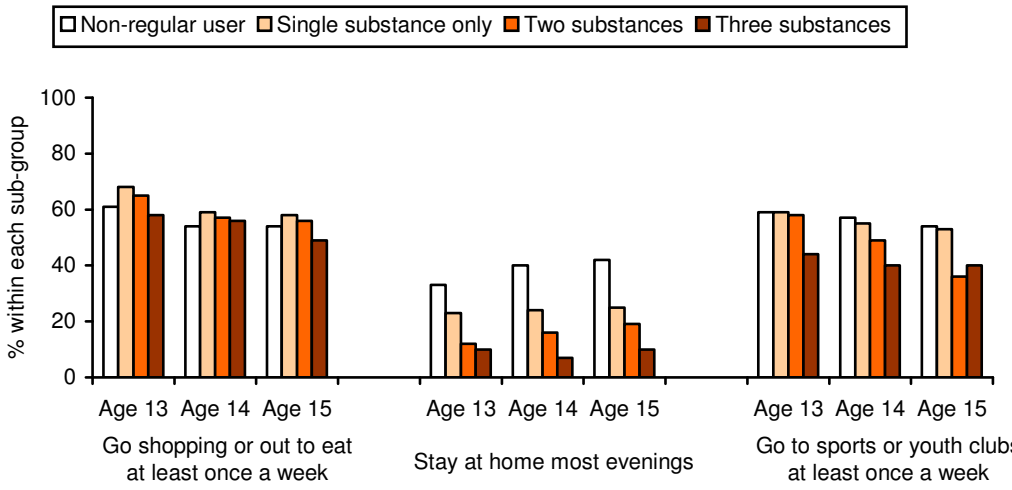

Figure 10: Prevalence of involvement in conventional or supervised activities amongst substance user sub-groups

Turning to the less conventional and unsupervised activities, figure 11 shows that the proportion of cohort members going to amusement arcades on a weekly basis was small. Differences between the groups were slight at ages 13 and 14, but at age 15 the double and triple users were more likely ($p<.01$) to report going to arcades than the other groups. Attending discos or nightclubs on a weekly basis was more common than going to arcades, but still fairly rare. Non-users were less likely ($p<.001$) to go to discos at all ages, whereas triple users were more likely to socialise in this way than the other groups ($p<.01$). The biggest difference between the sub-groups was in terms of the propensity to hang around in the evening. There were significant differences (all at least 95 per cent level) between all four groups across the board, with increased variety of substance use being strongly associated with increased tendency to hang out on the streets.

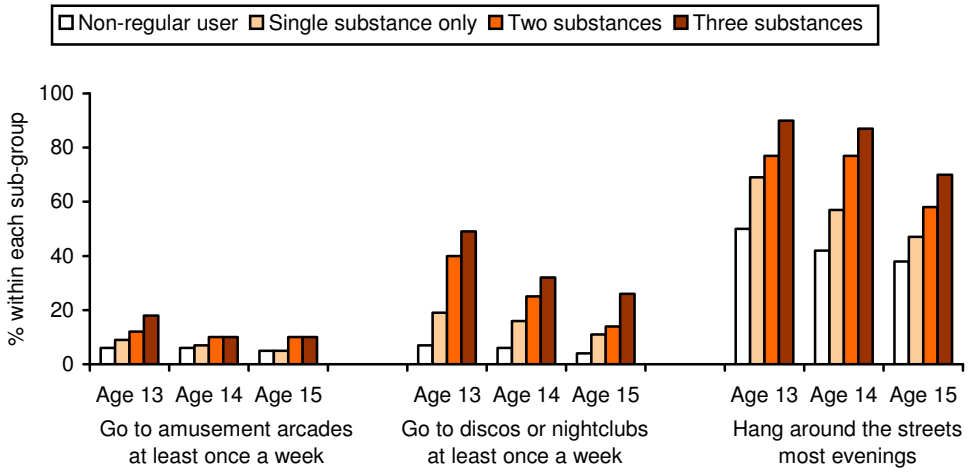

Figure 11: Prevalence of involvement in unconventional or unsupervised activities amongst substance user sub-groups

Peer influence

The Edinburgh Study cohort members were asked how many of their friends were involved in smoking, drinking and drug use. Table 12 shows the proportion of each group that said most or all of their friends used each of the three substances at ages 13 to 15. Two general trends emerge: first, there was a dramatic incremental rise in the proportion of young people who said that most or all of their friends took these substances according to the extent of their own substance use; and second, regardless of their own substance use habits, the likelihood of having many friends who drank alcohol increased with age, although the same was true in the case of smoking and drug use for the multiple substance users only. Overall, prevalence patterns for friends showed a similar pattern to those of the users themselves, although no causal relationship can be determined from such simple analysis. It is possible that this reflects a tendency amongst substance users to implicate their friends in the same type of behaviour to absolve themselves of guilt at their own substance use. However, the social nature of behaviours such as smoking and drinking, and to a lesser extent drug use, makes it extremely likely that these findings are an accurate reflection of the substance users' peer group.

Table 12: Prevalence of peer substance use by substance user sub-group, by age

Within group percentages

Peer substance use	Non-users	Single substance users	Double substance users	Triple substance users
Most/all friends smoked cigs				
- at age 13	6	23	49	77
- at age 14	9	32	62	84
- at age 15	9	25	62	83
Most/all friends drank alcohol				
- at age 13	12	41	59	73
- at age 14	27	73	83	96
- at age 15	36	79	86	96
Most/all friends took drugs				
- at age 13	0	*	1	6
- at age 14	1	4	18	42
- at age 15	2	6	27	46

Note: * denotes a percentage greater than 0 but less than 1.

Parental supervision

Three aspects of parental supervision were measured at each sweep of the Edinburgh Study, relating to the extent to which individuals movements were monitored (see panel 8 for details of the questions asked and response options). These three questions were combined into a scale ranging from 0 to 9, where 0 indicated that their parents never knew where they were, who they were with or what time they would return, whereas 9 showed very strong monitoring of the individual's movements.[12] Again, significant divergence was found between all four sub-groups in terms of the mean parental supervision scores. These are presented in table 13, below.

Panel 8: Questions about parental supervision.

When you went out during the last year, how often did your parents know:

- where you were going?
- who you were going out with?
- what time you would be home?

Response options: always, usually, sometimes and never.

The non-users were found to have a significantly higher ($p<.001$) parental supervision score than any of the substance user groups at all three sweeps. In addition, the single substance users had a consistently higher mean score than the multiple users (with differences significant at $p<.01$ or above). Differences were least amongst the multiple users, although the triple substance users did prove to be less well supervised than the double users at all sweeps ($p<.05$ or less at all ages). These findings are strongly consistent with the evidence presented earlier in this section of the report that sub-

[12] The parental supervision scale had good internal reliability, with Cronbach's alpha of .72, .71 and .71 for sweeps two to four, respectively.

stance misuse is highly associated with leisure pursuits away from the purview of parents and increased peer influence over behaviour.

Table 13: Mean parental supervision score by substance user sub-group, by age

Means

Mean parental supervision score	Non-users	Single substance users	Double substance users	Triple substance users
At age 13	7.0	5.9	5.0	4.2
At age 14	6.9	5.7	5.3	4.7
At age 15	6.8	5.9	5.5	5.2

Victimisation

Very little other research has looked at the links between substance use and victimisation amongst young people, although a review of research carried out by Burniston *et al* (2002) for the Scottish Executive found that amongst the difficulties faced by young people with drug misuse problems was "the danger of victimisation or exploitation by others (including dealers and pimps)". Given the fact that the Edinburgh Study has shown a close relationship between substance use and delinquency, discussed earlier in this report, and a strong and causative link between delinquency and victimisation (see Smith 2004), it did not seem unlikely that victimisation would also be shown to be associated with substance using behaviour.

Two measures of victimisation were included in the Edinburgh Study: *variety of victimisation* (a count of the number of different types of victimisation the respondent reported experiencing) and *volume of victimisation* (the cumulative frequency of victimisation across all the types asked about). A total of 5 items of victimisation were used to create both of these measures (these are listed in panel 9).[13]

Panel 9: Questions on victimisation.

During the last year, did anyone:

- threaten to hurt you?
- actually hurt you by hitting, kicking or punching you (fighting with you)?
- actually hurt you with a weapon?
- steal something of yours that you left somewhere?
- use threats or force to steal or try to steal something from you?

Response options: yes/no. If yes, 'how many times did that happen in the last year?'

The analysis reveals a strong association between extent of victimisation and substance use, with only occasional non-significant differences between substance user sub-groups. Figure 12 shows that the mean variety and volume scores for each of the four groups followed very similar trends. Non-users were significantly less victimised than all of the other groups ($p<.001$). Single users were also consistently victim-

[13] Mean variety ranged from 0 (non-victims) to 5 (victims of all five offence types); while mean volume ranged from 0 to a maximum of 55 (victims of all five offence types more than 10 times each). See Smith and McVie (2003) for more details on the construction of these measures.

ised to a lesser extent (p<.01 or above) than the multiple users, whereas the triple users proved to be more highly victimised than any other group.

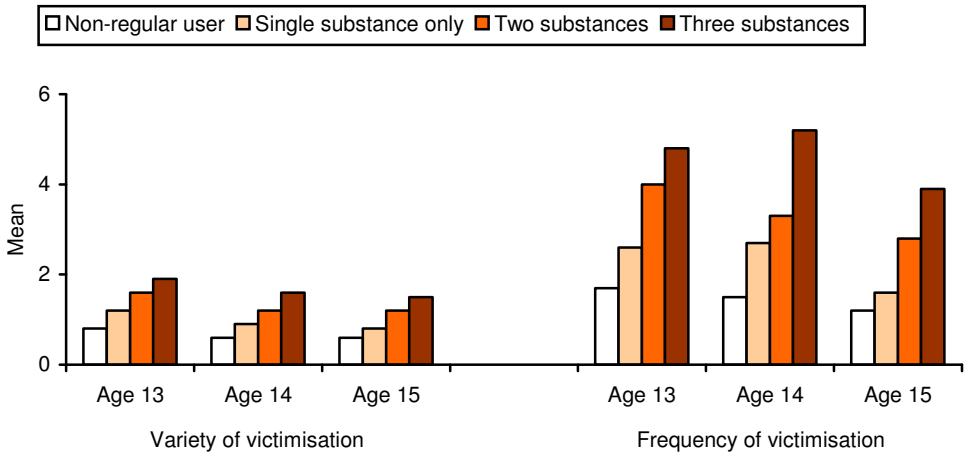

Figure 12: Mean variety and volume of victimisation amongst substance user sub-groups

CONCLUSION

The longitudinal evidence provided by the Edinburgh Study of Youth Transitions and Crime represents a significant and important addition to the burgeoning literature on substance use. Not only does it identify patterns, trends and gender differences in alcohol consumption, tobacco smoking and illicit drug use amongst a large cohort of early adolescents, but it provides individual level evidence about onset and sequential progression from one type or level of substance use to another. The analysis presented in this report demonstrates that regular alcohol consumption, tobacco smoking and illicit drug use starts for a small but worrying minority at a very early age and is relatively common practice by the age of 15. Amongst those who start using substances up to age 12 there is significant behavioural continuity whereby early experimentation leads to longer term use, at least during adolescence. In addition, there is strong evidence of sequential progression from occasional use of one substance to both regular use of the same and other substances. The data presented suggest that a key transitional point in the lives of young people occurs between the ages of 13 and 14, since that is the time-frame during which the greatest increases in both prevalence and frequency of alcohol, tobacco and illicit drug use occurred.

There is no denying the close association between alcohol, tobacco and illicit drug use, yet the inter-relationships between them are complex and difficult to unpick. Alcohol was the most common substance to be consumed in isolation, while smoking and illicit drug use were in almost every case linked to the use of at least one other substance. Although drug use was the least prevalent of the problematic health behaviours, regular drug users appeared to be the most likely to also be regular drinkers and smokers than the other way around. Notwithstanding the different definition of 'regular drug user', the probability of sequential progression from occasional use to regular use was also lowest for drug users, which suggests that progression to regular drug use might occur relatively quickly amongst users whereas there may be a greater period of development from occasional to regular use for drinking and smoking. Nevertheless, it is particularly significant that the progression to regular alcohol, tobacco or illicit drug use often occurred simultaneously, which suggests that similar factors or characteristics are implicated in this advancement to more persistent substance use.

Those who used two or three substances represented the most problematic and worrying group in terms of their characteristics. At age 13, there were some similarities between the non-substance users, the single substance users and those using two or three substances. Each of these groups was just as likely to participate in ordinary teenage leisure activities, such as going to sports or youth clubs and going shopping or for meals with their family, for example. However, there were also differences between the groups, which increased as they got older. Multiple substance users – particularly those using all three substances – were significantly more likely to be delinquent, impulsive, hang around the streets, spend time in 'adult oriented' venues such as amusement arcades and discos or nightclubs and to report associating with other substance users. They were also more likely to display worrying characteristics such as greater levels of victimisation, lower self-esteem and weaker parental supervision. In particular, it is important to note that girls were more likely to be multiple substance users than the boys at ages 14 and 15.

These findings support the notion that multiple substance users represent a fairly vulnerable and risk-prone sector of the population. Previous findings published from the Edinburgh Study suggested that victimisation and delinquency were predominantly linked as a result of the same activities, situations and social circles leading both to victimisation and delinquency (Smith 2004). Although not entirely synonymous, it seems likely that there are similarities in the reasons for the close links between victimisation and substance use. For example, individuals involved in substance use may place themselves in risky situations, participate in dangerous activities or associate with other anti-social and problematic individuals, all of which might put them at risk of being victimised or harmed by others.

These findings have clear policy implications for the development and implementation of educational and health-based initiatives to tackle adolescent substance use. There appear to be three distinct groups that would benefit from specifically targeted approaches. First, there are those who start using substances regularly from a very early age, for whom a policy of early intervention aimed at preventing the establishment of a long term and increasingly serious substance using history would be beneficial. Second, there are those who report using two or more substances, many of whom are also likely to have started using substances at an early age. The evidence suggests that these individuals are likely to be particularly problematic in terms of their behaviour, personality and lifestyle, but also to be vulnerable and lacking in parental control. This implies that intervention programmes focusing on substance use may be most effective if situated within a broader, welfare-based approach such as that offered by the Scottish children's hearing system. Finally, there is the adolescent population generally for whom a programme of general educational and preventative work up to and around age 13, when the greatest increases in prevalence and frequency occur, might be the most effective action. Given the complex interplay between the different substance types, an integrated response to the multi-faceted problem of substance misuse may be most beneficial, providing programmes which focus on alcohol, tobacco and illicit drugs together, rather than individually, for all three groups. In addition, it seems likely that a gendered approach to programme development might be advantageous in preventing or tackling the higher levels of substance use amongst adolescent girls.

APPENDIX 1 – ADDITIONAL TABLES

Table A1: Prevalence of drug use, by drug type and age

Column percentages

Type of drug	Age 12 (n=3811)	Age 13 (n=3823)	Age 14 (n=3811)	Age 15 (n=3804)
Cannabis	2.4	5.5	17.3	30.1
Volatile substances	3.8	2.9	6.9	5.2
Ecstasy	0.2	0.3	1.9	4.3
Cocaine	0.4	0.5	1.5	2.2
Speed	0.4	0.7	2.6	4.0
Heroin	0.1	0.3	0.6	1.0
LSD	0.2	0.4	1.4	1.7
Magic mushrooms	0.3	0.7	2.5	3.7
Downers	0.2	0.5	1.4	2.6
Poppers	0	0.1	2.4	4.7
Something else	0.2	0.3	0.5	0.6

Note: more than one response permitted.

Table A2: Mean frequency of drug use amongst drug users, by drug type and age

Column means

Type of drug	Age 12 (n=3811)	Age 13 (n=3823)	Age 14 (n=3811)	Age 15 (n=3804)
Cannabis	2.1	2.4	2.7	3.0
Volatile substances	1.8	1.7	1.9	2.0
Ecstasy	1.7	1.7	2.2	2.2
Cocaine	1.8	1.6	1.5	1.7
Speed	1.4	1.4	1.6	1.9
Heroin	1.3	1.9	2.1	2.4
LSD	1.3	1.7	1.8	1.9
Magic mushrooms	1.7	1.6	1.9	1.9
Downers	2.3	1.5	2.0	2.2
Poppers	0	1.8	2.2	2.1
Something else	1.3	2.0	2.3	2.3

Note: more than one response permitted.

Table A3: Prevalence of substance use by user sub-group

Column percentages

User sub-group	Age 12 (n=3716)	Age 13 (n=3739)	Age 14 (n=3678)	Age 15 (n=3587)
Non-user	94.0	80.8	59.0	46.3
Smoker only	1.0	2.7	2.9	2.7
Drinker only	2.7	10.5	21.8	26.4
Drug user only	1.1	0.4	0.7	1.1
Smoker & drinker	0.3	2.7	5.5	6.0
Smoker & drug user	0.3	0.5	1.0	1.9
Drinker & drug user	0.2	1.0	2.8	5.2
All three substances	0.3	1.4	6.3	10.3

Note: Non-user group includes non-regular users.

Table A4: Drinking behaviour of the cigarette smokers

Row percentages

	% weekly drinkers	% monthly drinkers	% occasional drinkers	% non-drinkers
Of the daily smokers:				
Up to age 12	28.0	12.0	52.0	8.0
At age 13	27.6	26.3	28.9	17.1
At age 14	53.9	24.6	16.2	5.3
At age 15	56.9	24.1	13.9	5.1
Of the weekly smokers:				
Up to age 12	11.8	17.6	54.9	15.7
At age 13	15.3	21.6	41.6	21.5
At age 14	36.0	34.3	24.6	5.1
At age 15	46.4	27.8	19.6	6.2
Of the occasional smokers:				
Up to age 12	3.0	6.5	69.4	21.1
At age 13	2.7	6.2	33.7	57.4
At age 14	18.2	34.2	41.7	5.8
At age 15	26.2	35.6	34.2	3.9

Table A5: Smoking behaviour of the alcohol drinkers

Row percentages

	% daily smokers	% weekly smokers	% occasional smokers	% non-smokers
Of the weekly drinkers:				
Up to age 12	13.2	11.3	30.2	45.3
At age 13	18.3	15.7	31.0	34.9
At age 14	37.0	9.6	24.2	29.1
At age 15	38.8	9.8	24.3	27.0
Of the monthly drinkers:				
Up to age 12	3.6	10.7	40.5	45.2
At age 13	10.8	11.6	29.0	48.7
At age 14	14.6	7.9	39.1	38.5
At age 15	16.3	5.8	32.7	45.3
Of the occasional drinkers:				
Up to age 12	0.8	1.8	23.7	73.7
At age 13	3.3	2.6	19.5	74.6
At age 14	4.6	2.7	22.8	69.9
At age 15	6.7	2.9	22.3	68.1

Table A6 – Mean variety of delinquency amongst substance user sub-groups

Column percentages

User sub-group	**Age 13 (n=3602)**	**Age 14 (n=3533)**	**Age 15 (n=3497)**
Non-user	2.0	1.9	1.4
Single substance user	4.8	4.1	3.0
Double substance user	7.0	5.8	4.7
Triple substance user	9.0	8.0	6.5

Note: Non-user group includes non-regular users.

Table A7 – Mean volume of delinquency amongst substance user sub-groups

Column percentages

User sub-group	**Age 13 (n=3602)**	**Age 14 (n=3533)**	**Age 15 (n=3497)**
Non-user	5.8	5.8	4.6
Single substance user	17.2	16.6	11.4
Double substance user	31.7	26.3	20.8
Triple substance user	45.4	43.2	34.1

Note: Non-user group includes non-regular users.

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