

Effective Interventions Unit

The Life Skills Training Drug Education Programme: A review of research

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EXECUTIVE SUMMARY

1. This study was a critical review of evaluations of the LifeSkills Training (LST) drug education and prevention programme. The focus of the review was primarily on evaluations of LST that assessed its impact on illicit drug use. The review was commissioned by the Scottish Executive's Effective Interventions Unit (EIU) part of the EIU's wider work on the identification of effective practice in the school-based sector of drug education.
2. The LifeSkills Training (LST) programme is a school-based programme delivered over 30 sessions over three years. It was developed in the USA and has been evaluated in a number of research studies. It is one of the few drug education programmes to have been as extensively evaluated. It is also vigorously promoted. Its aim to prevent use of alcohol, tobacco and illicit drugs is intended to be achieved by enhancing life skills believed to be critical mediating variables: assertiveness, self-esteem, social efficacy, social anxiety, influenceability and locus of control.
3. LST can have durable preventive effects on cannabis use if delivered relatively completely, but these effects are small in scale. For example, there were 4% fewer cannabis users among LST students in a six-year follow up study, measured in terms of weekly or monthly use, in a selected "hi-fidelity" sub-sample. This hi-fidelity sub-sample comprised those who had received at least 60% of the intervention, thus excluding those who received less than 60% of the programme. Fidelity of implementation was assessed by calculating the proportion of programme objectives covered during sessions that were observed. However, there was no statistically significant effect on cannabis use in the whole sample, including those who received less than 60% of the programme.
4. Effects on tobacco and alcohol, while not covered in detail in this review, are greater than the effects on cannabis but still relatively modest in scale.
5. LST had positive effects on reducing the numbers of those who used more than one of cigarettes, alcohol and cannabis. These effects were more consistently found in the sub-sample who had received more complete programme delivery. Across the various measures of combinations of cigarettes, alcohol and cannabis, the percentage reductions ranged from 3% to 8%.
6. There was some evidence of preventive effects on a wider range of drugs in a 6.5-year follow-up study. After statistical adjustment for school-level intra-cluster correlations there were statistically significantly fewer LST students who reported use of heroin and other narcotics, or hallucinogens. Similar reductions were found with composite measures of drug use: "total illicit substance use" and "total illicit other than marijuana", but no details were reported about the nature of this total use. There is doubt over the methodological soundness of this study, because it followed up only 7.5% of the original cohort and no selection rationale is given.
7. The programme only works when fidelity and completeness of delivery are both high. This is particularly important because attrition could be high amongst high-risk pupils.
8. A well-implemented LST programme can positively affect knowledge, attitudes and behaviour with respect to smoking and alcohol. There is limited evidence of similar effects for cannabis or other illicit drugs. The reason for these

effects may be due largely to changes in knowledge and attitudes rather than the acquisition of life skills. Nonetheless, the interactive nature of the LST programme may provide one of the better ways of facilitating knowledge acquisition and attitude change.

9. Booster sessions are argued to be an important element in maximising the impact of LST, but have little empirical support.
10. Training requirements are high for providers of LST.
11. While the theory is persuasive, there is little empirical support for it in the research reviewed. The programme does not appear to work for the reasons underlying its design, i.e. not in the way it is meant to work. Changes in knowledge and attitudes are consistently found, but changes in social competence and self-esteem are not. The interactive processes in teaching and learning methods are important.
12. It is not clear which aspects of the LST programme are essential for effectiveness. The interactive element is clearly important, but it is not clear that the sessions dealing with, for example, self-esteem and social competence are essential. In other words, while such sessions may not enhance, say, self-esteem, these sessions may indirectly facilitate the effectiveness of the programme.
13. The body of research over the past 20-years has explored most aspects of training, delivery and mediating variables. Gaps in knowledge regarding the impact of LST are mainly due to inconclusive results rather than lack of investigation.
14. There are doubts that whatever success is found in the research context would transfer to real life practice. The generalisability of the research findings is limited by selection of students, fidelity of implementation, and statistical problems.
15. There are many problems with the statistical analyses conducted in previous research; as a consequence great care is required in the interpretation of their results.
16. The programme can have statistically significant positive effects on substance use onset rates. However, to describe these effects as "highly effective" (as is done in LST promotional material) is to overstate the degree of effectiveness. When such promotional statements are supported with other statements using relative percentage differences rather than absolute percentage differences many observers will conclude that the programme is more effective than it actually is.
17. Nonetheless, it can be argued that expectations of drug education have been unrealistically high. The research on LST demonstrates that onset can be reduced or delayed in some young people. While it seems unlikely that LST, or any other universal primary prevention programme, could have a major impact on drug use and especially drug problems, it is one of the few programmes of this nature for which there is research evidence of positive impact, albeit limited positive impact.
18. On a small scale at school level, the effects of LST are likely to be very small. On a large scale, e.g. nationwide, the small effects may mean there is a measurable reduction in drug users in absolute terms, but the question arises

as to whether the costs and resources required for training and implementation to make this work for a small number of cases would be justified.

CHAPTER 1: INTRODUCTION

This report presents a critical analysis of the LifeSkills Training (LST) drug education and prevention programme developed in the United States of America by Gilbert Botvin. LST has been implemented in the USA for many years and is seen as one of the few effective programmes. It is therefore important to understand the nature of the effects this programme has on the samples of young people who have been researched. This report was commissioned by the Effective Interventions Unit (EIU) in the Scottish Executive Health Department in January 2002.

The EIU has a remit to identify and disseminate effective practice, based on sound evidence and evaluation, in prevention, treatment and rehabilitation. The Unit's remit applies to all aspects of the Scottish Executive's Drug Strategy, *Tackling Drugs in Scotland – Action in Partnership* (The Scottish Office 1999), including drug education. This study forms part of the EIU's wider work on the identification of effective practice in the school-based sector of drug education.

Background

This review was written in the context of significant developments in relation to drug education in schools: including the Scottish Executive's strategy *Tackling Drugs in Scotland: Action in Partnership* (Scottish Office 1999) and the UK government's drug strategy *Tackling Drugs Together to Build a Better Britain* (UKADCU 1998). The Scottish Executive has identified the need for evidence-based good practice: viz.

"Ensure that every school pupil in Scotland has *effective* drug education including accurate and up-to-date information on the consequences of drug misuse."
[Our italics.]

The importance of effectiveness is also identified in the UK strategy and this aspect of good practice is reflected in various guidance documents, such as that from the Department for Education and Employment *Protecting Young People: Good Practice in Drug Education Schools and the Youth Service* (DfEE 1998) and that from the Health Education Board for Scotland *Guidelines for Planning and Evaluating Drug Education* (HEBS 1997).

The limited scale of positive impact and the characteristics of drug education related to positive impact have also been described in broad terms in various reviews and meta-analyses (e.g. Coggans *et al* 1999; Sherman *et al* 1998; Tobler & Stratton 1997; O'Connor *et al* 1997; Coggans & Watson 1995).

Aim & objectives

The overall aim of this review is to:

Establish what is known about the effectiveness of a particular school based drug education programme (LST) in reducing the prevalence of substance misuse among young people. In addition, the work should aim to identify some of the process factors which may contribute to the programme's effectiveness, and make comment on its cultural transferability.

The specific objectives are:

1. To examine the methodology used in evaluations of the "LifeSkills Training" programme, and comment on the validity and reliability of the evidence of the programme's success in preventing or delaying young people's use of drugs.
2. To summarise the key findings of this evidence in terms of reducing or preventing drug use among young people.

Focus was on illicit drugs with appropriate reference to alcohol and tobacco. Tobacco and alcohol only evaluations were included only when they were of particular relevance/importance).

3. To summarise the impact of process factors on the programme's delivery and outcomes, including who delivers the programme, programme integrity, booster sessions, and schools' drugs policies.

Commentary is provided on these issues even if only to qualify the evidence base on which inferences have been drawn and identify gaps in knowledge. There is also commentary on the impact on life skills per se, as well as on drug use. It was not possible to comment on schools' drug policies, because schools' drug policies were not addressed in the research reports.

4. To consider the implications of cultural differences between the USA and Scotland, and comment on the transferability of the programme.

Commentary is provided where possible on what may or may not be applicable across cultures.

Methods employed for review

The full list of source material reviewed for inclusion is given in Annex 1. The primary criterion for inclusion was reports with data that assessed the effects of LST, within the terms of the following criteria for inclusion/exclusion of research reports:

- Included: primary research reports, meta-analyses and reviews of data-based research reports on the effectiveness of Botvin's LifeSkills Training programme.
- Excluded: research on any life skills drug education approaches that are not based on the Botvin programme.

The papers reviewed

The majority of the research reports were of studies of the impact of LST on smoking or alcohol use. The papers listed in Annex 1, starting in 1980, detail the effects of LST on white middle-class students and on ethnic minority groups (African Americans and Latinos). Dr Botvin and colleagues have published many articles and book chapters, which were not included in this review because they were commentary rather than data-based research reports. Starting in 1980 with the early smoking prevention evaluations, the key research papers address different aspects of the programme, including:

- Peer leaders
- Teacher leaders

- Modality of provider training
- Effects on potential mediating variables
- Substance use

The papers listed in Annex 1 were scrutinised for inclusion and are presented in the annexes for the purposes of completeness of reporting and as a quick reference guide in relation to the discussion of mediating factors in chapter 4. The papers included in the review are listed in the references.

Outline of this report

The remainder of this report presents

- The methods employed for the literature review
- A description of the LST programme, with reference to other life skills interventions
- Gateway drugs and drug education interventions
- The effects of LST, with a particular focus on illicit drugs, duration and limitations of effects
- Process variables – what mediates the success of LST?
- Methodological and statistical issues, including sampling, characteristics of the groups studied, research design, and presentation of results
- Cultural issues and transferability
- Key points and summary
- Annex 1: Papers reviewed for inclusion
- Annex 2: Statistical issues
- Annex 3: Rating scales and response options

The purpose of this report is to examine the evidence for the effectiveness of LST. As will be seen LST has been evaluated in many studies. This alone sets it apart from many drug education interventions, which are not well researched. LST is promoted vigorously and it is important that the basis for this promotion is examined carefully.

It is not possible to draw simple unqualified conclusions about the effectiveness of LST. As will be seen in chapter three, the conclusions drawn by the authors of the research reports are not always well supported by the evidence. This made it all the more important that the conclusions drawn in this report were carefully assessed, based on the evidence, and sound.

CHAPTER 2: LIFE SKILLS AND SOCIAL INFLUENCE PROGRAMMES

Life skills and social influences approaches to drug education

The origins of life skills/social influences approaches to drug education can be traced back to work carried out in the 1970s on the development of problem behaviours in young people (Jessor & Jessor 1977) and self-efficacy and social modelling (Bandura 1977). The rationale for developing such drug education programmes was the assumption that information in itself would not be sufficient to prevent young people from using drugs. Rather, there was a need to ensure that they had the skills to understand social pressures to use drugs and to be able to resist drug offers. In other words, this approach to drug education is based on developing social competence and draws on a body of theory that has informed understanding in relation to a wide range of so-called delinquent and age-inappropriate behaviours.

There is some evidence that life skills programmes and multi-component programmes which include life skills elements can delay onset of drug use or inhibit a move to harder drugs (Dorn & Murji 1992; Coggans *et al* 1999; Coggans & Watson 1995; Wragg 1992; Pentz 1993; Botvin *et al* 1995; Hurry & Lloyd 1997). A meta-analysis (Tobler & Stratton 1997) of 120 school-based programmes assessed effectiveness across a range of measures including drug use. This study defined two major types of programme on the basis of content and delivery methods:

- *Interactive*: using participative teaching and learning methods; and
- *Non-interactive*: using more didactic methods.

The interactive programmes were found to achieve significant (if modest) changes in knowledge, attitudes and drug use (principally 'gateway' drugs) among participants, while the non-interactive programmes affected only levels of knowledge.

Drug education and prevention

Before looking at the *LifeSkills Training* programme it is worthwhile to distinguish between drug education and prevention. Prevention of drug use or drug-related problems are goals of drug education. Drug education is the process by which prevention is achieved. Without effective teaching and learning processes drug education will not have the desired impact. Effective health education produces changes in a) knowledge, understanding, ways of thinking, b) influences values, beliefs, and attitudes, c) facilitates skills acquisition, and d) changes behaviour. However, it is easier to influence knowledge gain than to influence behaviour.

Most drug education programmes delivered in schools have the goal of preventing drug use (with the exception of moderate alcohol consumption when age appropriate). However, drug education can also have the goal of harm reduction - that is, reduction or minimisation of drug-related harm. Delaying the onset of drug use (cigarettes, alcohol or cannabis) is itself often considered a useful outcome, on the basis that the older people are when they experiment with substances the less likely they are to develop problems.

The LifeSkills Training Programme (LST)

Some life skills/social influence programmes have a relatively narrow focus on resistance skills training – skills to recognise and resist pressure from others to use drugs. LST, however, addresses a broader range of personal and social skills. LST consists of more than simple provision of drug information or resistance skills training, but aims also to tackle underlying, mediating psycho-social factors in the origins of drug use.

The main goals of LST are “are to teach prevention-related information, promote anti-drug norms, teach drug refusal skills, and to foster the development of personal self-management skills and general social skills.”¹ More particularly, LST is designed “to:

- provide students with the necessary skills to resist social (peer) pressures to smoke, drink and use drugs
- help them to develop greater self-esteem, self-mastery, and self-confidence
- enable children to effectively cope with social anxiety
- increase their knowledge of the immediate consequences of substance abuse
- enhance cognitive and behavioral competency to reduce and prevent a variety of health risk behaviors”

It is noteworthy that the programme focuses on general life skills as well as on some more specific input on drugs. LST covers three aspects of personal development claimed to be important mediators of drug use:

- Drug resistance skills;
- Personal self-management skills; and
- General social skills.

The programme elements of LST

Drug resistance skills: intended to help young people understand common misconceptions about tobacco, alcohol and other drug use.

Personal self-management skills: aims to help young people understand the relationship between their self-perceptions and their behaviour, as well as develop resistance skills in relation to peer and media pressure to use substances.

General social skills: aims to enhance self-esteem, interpersonal skills, and assertiveness.

¹ Details of the Life Skills Training Programme are available on the internet at <http://www.lifeskillstraining.com>, part of the marketing strategy for the programme. Gilbert Botvin is Professor of Public Health and Psychiatry and is Director of the Institute for Prevention Research at Weill Medical College of Cornell University.

LST is delivered over 30 sessions of about 45 minutes each. This takes place over 3 years, starting with 15 sessions in the 6th grade (11-12 years of age) or 7th grade (12-13 years of age) which cover the core curriculum in all skill areas. The remaining 15 booster sessions are delivered in the next two years: 10 sessions in the year following delivery of the core curriculum and 5 sessions in the year after that. These booster sessions are intended to provide additional opportunities for skills development and practice. The booster sessions are considered necessary for effective impact.

Delivery of LST	
Year 1	Core curriculum: 15 sessions
Year 2	Booster: 10 sessions
Year 3	Booster: 5 sessions

The programme has recently been adapted for use with younger groups starting in the 3rd (8-9 years) or 4th grade (9-10 years). This elementary school version comprises 24 sessions (30-45 minutes duration each) with 8 sessions delivered in year one, 8 booster sessions the following year and a further 8 booster sessions in year three.

The LST programme is intended to be delivered sequentially, either as an intensive course (every day or 2-3 times per week) or an extended course (one session per week).

The programme is designed to be interactive and participative. For example, in the lesson on overcoming shyness young people would be involved in a discussion about experience of and reasons for shyness in social situations, as well as about what can be done about it. In addition, they would be encouraged to act and develop scripts for different social situations. The young people are encouraged to practice in the classroom, at home, and to develop strategies for introducing themselves to others in a range of situations. There may be no mention of drugs in lessons such as this.

In summary, the LST programme aim of prevention is intended to be achieved by enhancing life skills believed to be critical mediating factors:

- assertiveness;
- self-esteem;
- social efficacy;
- social anxiety;
- influenceability; and
- locus of control.

The LifeSkills Training programme is promoted as:

*"a proven, highly effective, substance abuse prevention/competency enhancement programme designed to focus primarily on the major social and psychological factors promoting substance use/abuse."*²

The underlying theory is persuasive. However, a persuasive theory is not sufficient. As with all theories it is important to test the theory by implementation and evaluation. This issue is addressed later in this report.

² See the Life Skills Training programme website at www.lifeskillstraining.com

Critical mediating factors in LST

The *assertiveness* element addresses verbal and non-verbal assertive skills, situations that call for assertiveness, reasons for not being assertive and resisting peer pressures to smoke.

Self-image covers the importance of a positive self-image, ways of improving self-image, how self-image is formed, and the relationship between self-image and behaviour.

Social-efficacy is concerned with overcoming shyness, strategies for overcoming shyness, initiating social contacts, making contact and behavioural rehearsal exercises, conversational skills, and practising social skills.

Social anxiety addresses situations that cause anxiety, demonstration and practice of techniques for coping with anxiety.

Influenceability looks at the nature of advertising, identifying techniques used in cigarette advertising, and alternative ways of responding to such adverts.

Locus of control is a personality measure that addresses the extent to which someone believes whether the results of their own actions are related more to what they do (internal) or more to events outwith personal control.

The core questions to be asked of the research data are:

- Does LST prevent drug use?
- If so, how does it work?
- Is the impact of LST affected by the ways in which it is delivered?

Other life skills and social influence programmes

There are other drug education programmes that have a life skills and social influence approach. What is interesting here is that the 'badge' – i.e. being described as a life skills/social influence approach – is not sufficient. The teaching and learning methods have to be appropriate for positive impact. Two key examples are described below that illustrate differences in impact.

Project ALERT

Project ALERT was developed by RAND, a respected American think tank. It has been shown to produce positive impact on cigarette and cannabis onset rates. The positive impact did not, however, last beyond the end of the high school career (Ellickson *et al* 1993). This programme was one of two best practice programmes included in an assessment of the cost-effectiveness of school-based drug education (Caulkins *et al* 1999), along with Botvin's LifeSkills Training programme.

Project ALERT is delivered in 14 lessons over two years: 11 in year one and three booster sessions the following year. The approach used in Project ALERT involves participatory activities, discussions, small group activities, role-play, and parent-involved homework.

Central to Project ALERT is resistance self-efficacy: young people's belief that they are able to resist pressure to use substances, which the programme aims to enhance through practice, reinforcement and modelling.

DARE

Another drug education programme that describes itself as focussed on the life skills approach is DARE (Drug Abuse Resistance Education). This programme has become one of the most widely used, and widely promoted, programmes in the English-speaking world, particularly in the USA.

DARE is intended to be uniformly delivered and is highly structured. Police Officers responsible for delivering DARE are trained in classroom management, teaching strategies, communication skills, children's development, drug-related information, and the (17) lessons that comprise the DARE curriculum. The DARE curriculum is delivered over 17 weeks in hour-long sessions, using lectures, workbook-based exercises, questions and answer sessions, and makes use of audio-visual materials and role-playing.

While a central aim of DARE is to enhance peer-resistance skills by equipping participants with a range of refusal strategies, DARE also includes elements of other prevention approaches: namely, cognitive (e.g. drug-related information), affective (e.g. self-esteem building) and social skills strategies (e.g. assertiveness). The programme is normally targeted at young people in their last year of elementary school; in US terms, the 5th Grade (10-11 years) or 6th Grade (11-12 years).

Despite considerable enthusiasm for this programme it is of doubtful effectiveness. Various studies have assessed the effectiveness of DARE and concluded it had:

- no lasting impact (Ennet *et al* 1994);
- only limited effects in a five year follow-up study (Clayton *et al* 1996);
- significantly less effect than life skills and social influences programmes which employed more participative methods than DARE (Tobler & Stratton 1997).

A major review of crime reduction interventions concluded that DARE simply did not work (Sherman *et al* 1998). Given that only small effect sizes were demonstrated for the life skills and social influences programmes that were found to be more effective than DARE in the Tobler & Stratton (1997) meta-analysis, the weight of evidence raises significant doubts about the effectiveness of DARE.

DARE has a presence in the UK, initiated by Nottinghamshire Police in 1994 (Keene and Williams 1996) and has since been taken up in other areas. Whelan & Culver (1997) evaluated the impact of the DARE programme on a group of young people in Nottinghamshire and concluded that it did not prepare them 'for the reality of drug offer situations'. In the light of this and other limitations of the programme Whelan & Culver (1997) also concluded that there were 'opportunity costs' which should be considered by schools which use the DARE package. In a crowded curriculum it is important that the time available for drug education is used to best effect.

It seems likely that DARE's lack of effectiveness can be linked both to the content of the programme, which presents an atypical picture of social processes, and also to a lack of effective learning methods, which tend to be more didactic than participative. DARE is an example of the type of programme found to be less

effective than participative life skills programmes in the Tobler and Stratton (1997) meta-analysis discussed above.

DARE is currently working to make the intervention more interactive, but it remains to be seen whether this will enhance effectiveness.

Life skills in drug education in Scottish schools

The principal aim of drug education in Scottish schools is to provide information and promote pupils' decision-making skills (Lowden & Powney 2000). Lowden & Powney also concluded that most primary and secondary schools' drug education was based on resources such as Drugwise and materials from TACADE, as well as in-house material. In the main, these resources are based on aspects of the life skills/social influences approach, although they vary in content and extent. Moreover, the resources currently used in Scotland differ from LST.

It is also worth noting that the Scottish Drugwise 12-14 programme was in widespread use at the end of the 1980s when the national evaluation of drug education was carried out. This programme was developed in the mid-1980s and based upon the life skills approach. The national evaluation found that drug education in Scotland had no effect on drug use or drug-related attitudes. While there was a statistically significant increase in drug-related knowledge, the amount of increase was minimal (Coggans *et al* 1991).

During the 1990s the Drugwise materials were revised and extended to reach younger age groups. Although there has been no major outcome evaluation of drug education in Scotland since the end of the 1980s, Lowden & Powney (2000) reported the views of pupils who said that drug education had helped them to reduce the risks associated with drug use.

Best Practice in Life Skills & Social Influence Programmes

Gilbert Botvin's LST programme is based on the social influence approach that considers social influences (such as peers or the media) and intra-personal factors (such as self-image) as important determinants of drug use. While other life skills/social influence programmes have been developed and implemented with some or no success, LST is considered to be one of the few examples of best practice in drug education. It is evident that there are differences in impact across different drug education interventions based (in varying ways) on the life skills/social influences approach. This report describes and discusses below both the outcomes and processes of LST. Before moving on to this more detailed examination of the effects of LST, the next section presents a brief discussion of 'gateway drugs' – smoking, alcohol and cannabis –because the focus of LST is primarily on these so-called gateway drugs.

Gateway drugs and drug education interventions

Most evaluations of LST have assessed impact on drug use in terms of use of tobacco (cigarette smoking), alcohol and cannabis: drugs often described as 'gateway drugs'. This is not surprising given the age range of those studied in evaluations of LST, namely school students.

It is often asserted that drugs problems are the consequence of earlier use of 'gateway drugs': alcohol, tobacco and cannabis/marijuana. This perception of a causal link between use of alcohol, tobacco and cannabis/marijuana and development of later drug problems is a central tenet of American drug policy

(Golub & Johnson 2002). The sequence of drug use stages identified by Kandel (e.g. Kandel & Faust 1975, Kandel & Logan 1984, Kandel & Yamaguchi 1993) is often misconceived as reflecting causal links between the stages. In this sequence use of cigarettes and beer would typically precede cannabis use, which in turn would typically precede use of harder drugs such as amphetamines before moving on to 'hard' drugs cocaine or heroin.

Yet, Kandel stated clearly in her original 1975 paper, and in subsequent papers, that an association between heroin use and earlier cannabis use is not evidence of a causal or pharmacological relationship between these two aspects of drug use. Golub and Johnson (2002) found that the use of gateway drugs by young people is not the cause of problematic hard drug use. The reasons for developing problematic drug use are much more complex, involving a range of psychological and sociological factors. So much so, that Golub & Johnson (2002) argue "fighting the use of gateway drugs by youths may not be a particularly appropriate approach to drug abuse prevention."

What is striking about the stages of drug use is that, while problematic heroin or cocaine users would in most cases have started their illicit drug use careers with cannabis, only a very small minority of cannabis users go on to become problematic hard drug users. While there is some evidence that those who use more frequently or start younger may be more likely to progress to more damaging drug use (Kandel & Davies 1992, Fergusson & Horwood 1997), such progression is likely to be influenced by other risk factors.

In the past the term 'gateway drug' was reserved for cannabis, in the sense that it has for many years been described as a drug the use of which predisposes the individual to use of 'harder' drugs such as cocaine or heroin. More recently, the term has been extended by some, but by no means all, commentators to include tobacco and alcohol. It is clear from the work of Kandel and others that the first substances used by most people who 'progress' to any stage in drug use are cigarettes and alcohol.

This means that positive LST impact, in terms of continued abstinence or delayed onset, has the theoretical potential to reduce the likelihood of harmful patterns of drug use developing in subsequent years. However, it is not clear whether LST impacts on those who are more at risk of developing harmful drug use patterns. Moreover, this theoretical potential to reduce likelihood of progression to hard drug use does not take account of other risk factors outwith the scope of LST.

One of the studies discussed in chapter three does provide some evidence for the gateway hypothesis in terms of links between smoking and drinking and later illicit drug use. However, later marijuana use/non-use was not predicted by involvement in the LST programme (see chapter 3).

The term 'gateway' can mean different things. A paper submitted by DrugScope to the recent Home Affairs Select Committee enquiry into drug misuse summarised the different interpretations of the gateway concept (DrugScope 2001). This paper noted the distinction between the stepping stone theory and the gateway theory.

The stepping stone theory contends that cannabis use leads to use of harder drugs through physiological changes in brain function: in other words, cannabis causes use of harder drugs. However, this is not supported by evidence.

The gateway theory is distinct from the stepping stone theory in that while it is recognised that there can be progression to harder drug use from use of softer

drugs this is not regarded as an inevitable process. The precise mechanism of the gateway theory is less easy to define. For example, cannabis users may be more likely to use other illicit drugs if they perceive cannabis to be less risky than it has been portrayed to them in the past, and if they associate with people who use other illicit drugs.

What is not explained by this more precise and more plausible definition of the gateway theory is the distinction between experimentation or recreational use of substances and use that is characterised by problems and dysfunction. That is to say, just because someone uses a drug to some extent does not mean that they will necessarily develop problematic or dysfunctional patterns of use. To answer this question it is necessary to take account of other risk factors that become compounded with early stage drug use and make problematic drug use more likely (Hawkins, Catalano & Miller 1992). Young people are more likely to develop problematic patterns of substance use if their formative years are characterised by inadequate emotional support, inappropriate control and a lack of family cohesion (Foxcroft & Lowe 1991).

While drug prevention interventions could, in theory, address some of these risk factors it is unlikely that universal interventions could compensate for the considerable difficulties experienced by young people who are more at risk. In other words, LST may work best with those less at risk of developing problematic patterns of drug use, as distinct from other forms of drug use. Nonetheless, even if LST has little or no impact on those who are more at risk of problematic drug use, there is an argument in favour of drug education that enhances protective factors among those who are at the experimental and recreational end of the drug use spectrum.

For the above reasons, consideration of the effects of LST on tobacco and alcohol is of relevance even though this report is centred on the effects on use of illicit drugs. The next section examines in detail the effects of LST, though studies concerned purely with effects on alcohol and tobacco use are for the most part excluded.

CHAPTER 3: EFFECTS OF LST ON DRUG USE & POTENTIAL MEDIATING FACTORS

Overview of Chapter

This chapter outlines the studies that provide the most relevant information on the effects of LST on drug use. Before looking in more detail, later in this chapter, at evaluations of the impact of LST on illicit drugs, this chapter will begin by reviewing what was learned from the early evaluations of the effects of LST on smoking.

The set of studies reviewed in this chapter can be broken down into three categories.

- First, the early smoking studies.
- Second, later studies concerned with the longer-term effects of LST and its effects on use of illicit drugs.
- Third, a number of other studies concerned with specific aspects of LST on marijuana/cannabis use.

The studies within these three categories are first identified in the boxes below and subsequently discussed in more detail in the remainder of this chapter.

LST was developed originally as a smoking prevention programme for junior high school students. In the early smoking studies with middle-class school students LST was delivered to a range of target groups.

The Early Smoking Studies

Study 1: The effectiveness of a 10-session programme was assessed. There were no booster sessions in this intervention and the 10 sessions covered the core ground of the LST social psychological approach. An outside expert with a health profession background delivered the programme.

Study 2: This assessed the utility of peer leaders who delivered a 12-session LST programme.

Study 3: This assessed the effectiveness of a 15-session LST programme delivered by regular classroom teachers, comparing intensive delivery over a short time period with more extensive delivery over a longer time period. This study also assessed the effects of eight booster sessions delivered the year after the initial intervention.

Later studies were concerned with the longer-term effects of LST and its effects on use of illicit drugs.

Longer-Term Effects Of LST And Effects On Use Of Illicit Drugs

Study 4: This is a three-year follow-up study comparing two experimental groups with different kinds of teacher training on the effects of LST on smoking, drunkenness and marijuana use.

Study 5: This is a six-year follow-up study comparing smoking, alcohol consumption, marijuana use and 'polydrug' use.

Study 6: This is a six-and-a-half year follow up of the effect of LST on the use of marijuana, heroin, other narcotics and hallucinogens.

Finally a number of studies concerned with specific aspects of LST on marijuana use are considered.

Other Studies Concerned With Specific Aspects Of LST On Marijuana/Cannabis Use

Study 7: This compares the relative effectiveness of peer educators and teachers.

Study 8: This study considers the effect of booster sessions with peers and teachers.

Studies 9a, 9b, 9c & 9d: These consider the effect of LST on minority groups.

Study 10: This considers the gateway hypothesis i.e. the stage sequential model of early smoking or alcohol use being related to later drug use.

Study 11: This considers a recent attempt to target LST at younger age groups.

Study 12: This compared LST with a family involvement intervention and compared a joint intervention against controls.

The remainder of this chapter discusses these sets of studies in more detail.

The early smoking studies

The early studies assessed different aspects of the programme:

- the effectiveness of the intervention;
- whether peer leaders as well as health professionals or teachers could deliver the programme;
- whether the intensity of delivery was important; and
- whether booster sessions would add to the effectiveness of the programme.

In addition to assessing the impact of the LST programme on smoking, the role of potential mediating factors was examined. In Chapter 2, the way in which the intervention programme is thought to work was described, by enhancing life skills believed to be critical: assertiveness, self-image, social efficacy, social anxiety, influenceability and locus of control. The effect of LST on some of these variables was considered in most studies.

Study 1: Impact on smoking

Botvin, Eng & Williams (1980) reported that LST, delivered to predominantly middle-class students drawn from 8th Grade (13-14 years), 9th Grade (14-15 years) & 10th Grade (15-16 years), had a significant impact on initiation of smoking. However, this impact was differentially based on the younger students in that there was less impact on older groups.

Study 1 Design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 281 Used in analysis: 187/281	LST 10 sessions Control 3 age groups	Number who started smoking

There was no clear pattern of effects on the potential mediating factors, although there were some significant effects. The lack of a clear pattern of effects on potential mediating variables means that interpretation would be more speculative than statistically based.

There were weaknesses in the presentation of the findings of this study. Although the abstract of this paper refers to a sample of 281 only 187 were included in the analysis of LST effects on smoking, due to exclusion of pre-test smokers. However, in the analyses of the potential mediating variables (knowledge and personality variables) it appears that pre-test smokers were included³. This detracts from any conclusions that can be drawn about the mediating role of these variables. Moreover, the potential mediating variables affected varied across the three age groups studied. Brief description of this study is included mainly because it was the first in the 20-year series of evaluations covered in more detail below.

Summary of Study 1: Effect of LST on smoking

10 sessions of LST had a significant impact on the initiation of smoking, but the effects on mediating variables as would be predicted by the underlying theory were inconsistent and not as expected.

³ Statistical point. The sample sizes in these analyses are not given, but appear, from the degrees of freedom reported, to include the pre-test smokers.

Study 2: Impact on smoking – peer led LST

The impact of LST delivered in 12 sessions by peer leaders to predominantly middle- to upper-middle-class 7th grade students (12-13 years) was measured at 3 and 12 months follow-up (Botvin & Eng 1982).

Study 2 Design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 426 Used in analysis: 245 - 307	LST – 12 sessions Control	Smoking during last Month/week

The peer leaders were recruited from a high school adjacent to the junior high school participating in the LST intervention. No details are given in the research report about the age of the peer leaders, but they were characterised as being non-smokers, popular, active in extra-curricular activities, self-confident, interested in promoting non-smoking, and likely to have high credibility with potential smokers. The peer leaders received an initial four-hour training event, a teacher's manual detailing the lesson plans, plus weekly one-hour briefing sessions during the period of delivery.

At 3 months there were fewer LST students than controls who reported smoking in the previous month, but there was no impact on smoking in the last week. At 12 months the reverse pattern was found with only significantly fewer smokers in terms of the past week measure, but not the past month.

In this study, impact on potential mediating factors was assessed at 3 months follow-up. Significant changes in three knowledge measures (smoking, psychosocial & advertising) and two psychosocial measures (social anxiety & influenceability) were found in the desired directions. However, the relationship between these potential mediating variables and smoking behaviour was mixed, as these desired changes were not related to smoking behaviour on the monthly smoking measure¹, while the desired changes were related to smoking behaviour on the weekly measure¹. As the significant difference in smoking at three months was found with monthly but not weekly smoking, and at 12 months the reverse was true, any inference of a role for mediating variables is speculative.

Again, there were some weaknesses in the presentation of the findings. The age of the older peer leaders was not given. Also, although this study is presented as testing a sample of 426 the numbers analysed fell below this varying from 245 to 301 depending on measures used.

Summary of Study 2: LST delivered by Peer Leaders

The LST programme had some effects on smoking after 3 and 12 months when the programme was delivered by peer leaders rather than teachers. As with study 1 the effects of the programme on appropriate mediating variables was inconsistent and not appropriately related to the effects on smoking.

⁴ Statistical point. Discriminant function analysis, using monthly smoking as the criterion variable, showed no significant discriminatory effect for these potential mediating variables. Discriminant function analysis, using weekly smoking as the criterion variable, showed a significant discriminatory effect for these potential mediating variables. function analysis, using weekly smoking as the criterion variable, showed a significant discriminatory effect for these potential mediating variables.

Summary of Study 2: LST delivered by Peer Leaders

The LST programme had some effects on smoking after 3 and 12 months when the programme was delivered by peer leaders rather than teachers. As with study 1 the effects of the programme on appropriate mediating variables was inconsistent and not appropriately related to the effects on smoking.

Study 3: Impact on smoking- Extended or intensive delivery and booster sessions

A comparison was made between LST delivered one session per week for 15 weeks and LST delivered more intensively over one month (Botvin, Renick & Baker 1983). The possible added value of including booster sessions, to reinforce LST effects, was also explored in this study of predominantly white (91%) middle- to upper-middle-class students. Smoking status was measured at 4 months and 12 months. A sub-sample received an 8-session booster programme between 4 months and 12 months post-tests.

Study 3 Design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 902 Used in analysis: 831-876	LST Intensive 1 month LST Normal 15 weeks LST 15weeks + booster Control	Smoked during last month/week/day

At 12 months follow-up there were significantly fewer smokers on the monthly, weekly and 24 hours measures in both delivery modes, but the intensive stand-alone delivery condition was more effective than the integrated approach. While there were indications that the booster sessions reinforced the effects of LST on smoking behaviour, these were not statistically significant.

Although differences in smoking behaviour related to booster sessions were not significant in the results section (perhaps because of small numbers), it is stated in the discussion that there were 60% fewer new regular smokers in the group with booster sessions. **That is, 3 people in the intensive condition without the booster sessions and 1 in the intensive condition with the booster sessions!**

Examination of the effects on potential mediating variables showed that, at 4 months follow-up, with the two experimental groups' data aggregated, significant differences were found in comparison to the control group in knowledge (smoking & psychosocial), assertiveness, and influenceability (smoking & general). When the two experimental groups were analysed separately in comparison to the control group fewer significant impacts on potential mediating variables were found. This suggests that there is a degree of overlap between the experimental conditions in terms of impact on potential mediating variables, although the stand-alone condition appears to have had slightly more influence on a few variables.

At 12 months follow-up, for the aggregated experimental conditions data, there was an impact on smoking and psychosocial knowledge, locus of control, and attitudes towards smoking. When analysed separately, there was more impact evident for the intensive stand-alone condition, although a different pattern of findings was evident suggesting no clear influence of LST on potential mediating

variables. In addition, the booster sessions appear to account for the impact on potential mediating variables.

Summary of Study 3: Intensive programme and booster sessions

LST spread intensively over 1 month was more effective than the weekly sessions spread over 15 weeks. Booster sessions had a non-significant effect on smoking but did affect some potential intervening variables.

Lessons from the early smoking studies

The consistent message from the early smoking studies was that LST could have desirable effects on smoking behaviour. It appeared that it was possible to obtain these effects using regular classroom teachers or peers leaders. There was also evidence that intensive delivery could achieve better results and some indications that booster sessions might be useful. As the programme was extended to address other substances these issues were examined in more detail in later evaluations that produced the core findings upon which rests the reputation of LST for effectiveness.

Longer term effects of LST and effects on use of illicit drugs

The central issue with LST is the preventive effect it has on drug use. Three key research reports present the findings of 3-year, 6-year and 6.5-year follow-up studies. These studies are highly relevant to understanding the longer-term preventive effects of LST, discussed below. These three studies are based on data gathered from sub-samples of the same original cohort. The students were predominantly white middle class.

Study 4: Three-year follow-up study

The first study in this linked set of three evaluations was a three-year follow up, which provides some additional insights into the nature of LST's preventive effects (Botvin, Baker, Dusenbury, Tortu & Botvin 1990).

Pupils received 15 periods of LST in 7th grade (12-13 years), 10 booster sessions in 8th grade (13-14 years) and 5 further booster sessions in 9th grade (14-15 years). There were two intervention groups:

- E1: LST delivered by teachers who had undergone a one-day training course and received feedback on the implementation of the programme; and
- E2: LST delivered by teachers who were trained by video and had received no implementation feedback.

The impact of LST on substance use, with these two levels of teacher training, was compared with a third control group that did not receive LST.

Study 4 Design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 5954 Used in analysis: 4466 Hi-Fidelity sample: 3684 ⁵	E1: Teachers one day training + Feedback E2: Video training no feedback Control	Mean school rates for smoking, drinking, drunkenness marijuana use

Substance use was measured on 9 and 10 point rating scales (see Annex 3 for rating scales response options), although mean ratings were on the bottom end of the scales as outlined below.

- *Smoking*: 10-point scale: response tags 1 = "never" and 2 = "not in the last 12 months".
- *Drunkenness*: 9-point scale: response tags 2 = "drink but never get drunk" and 3 = "less than once a month".
- *Marijuana*: 9-point scale: response tags 1 = "never tried it" and 2 = "tried it, but don't use it now".

Impact of LST

Significant effects were found for three of five substance use variables:

- smoking (with both E1 and E2 groups);
- drunkenness (with E2 group only); and
- marijuana use (with both E1 and E2 groups).

(Two other variables - drinking frequency and drinking amount - showed no significant effects and are not described here.)

Average scores on the three scales showing differences across the three groups are summarised in Table 1 below.

Table 1: Mean substance use in 3yr study				
	E1	E2	Control group	Significance
Smoking	1.46	1.50	1.63	P<0.01
Drunkenness	2.19	2.19	2.32	P<0.05
Marijuana	1.51	1.54	1.66	P<0.05

It is clear from the results summarised above that levels of substance use were low overall, including in the control group. Average scores for smoking were below 'not in the last 12 months' even for the control group. For marijuana use, average scores were below 'tried it, but don't use now', again even for the control group. Since data were analysed at individual level, levels of smoking and marijuana use in LST students were statistically significantly lower than in the

⁵ The sample of 3,684 was a sub-set of the 4,466 pupils who provided before and after data (75% of the original sample of 5,954 pupils). The basis for focussing on these 3,684 pupils was that they had received 60% of the intervention programme. The sample was 91% white.

control group, due to the large sample sizes, but the difference between the groups was small. On the basis of the data reported it appears that the nature of impact was limited.

Irrespective of the level of marijuana use, video training for teachers (E2) was as effective as direct workshop training (E1).

This study raises an important issue about the focus of analysis in studies (see Problem B below)

Summary of Study 4: Three-Year Follow-up of Effects of LST

This large-scale study showed that effects of an LST programme on smoking, drunkenness and marijuana use could be demonstrated 3 years later. The effects are very small, and only marginally significant despite very large samples. Whether teacher training for LST was by workshops and feedback or just by video training did not appear to be important.

Study 5: Six-year follow-up study

The above study was followed up three years later by Botvin, Baker, Dusenbury, and Botvin (1995). This study of 3597 students provided pre-intervention and six-year follow-up data for 3597 students in 56 schools. The 3597 represents 60.4% of the original sample of 5954.

Study 5 Design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 5954 Used in analysis: 3597 Hi-Fidelity sample: 2752 Schools: 56	E1 Teachers one day training + feedback E2: Video training no feedback Control	Mean school rates For smoking, Drunkenness Marijuana use etc.

This study reported (in some cases, large percentage) differences between intervention and control groups in terms of measures of cigarette smoking, alcohol consumption, marijuana use and "polydrug use" (defined as use of more than one of cigarettes, alcohol or marijuana). Table 2 below shows the mean proportion of pupils using drugs for schools in the three groups for the complete sample

Table 2: Mean proportion using drugs for schools for total sample				
	E1	E2	Control group	Significance
Smoking weekly	0.23	0.21	0.27	P<0.05
Alcohol weekly	0.29	0.24	0.29	Not significant
Marijuana weekly	0.13	0.13	0.14	Not significant
Marijuana monthly	0.06	0.06	0.09	Not significant

Using the whole sample, only smoking shows significant effect of the LST programme. There was no statistically significant difference in monthly or weekly use of marijuana in those students providing before and after data. Though the data tables all report the number of individuals on which the data are based, all analysis was performed with school (N=56) as a unit. All rates quoted are mean rates for schools.

Table 3 below shows similar results in a hi-fidelity sample of 2752 for whom there was at least 60% implementation of the programme. This hi-fidelity sub-sample comprised those within the full sample who had received at least 60% of the intervention, thus excluding those who received less than 60% of the programme. Fidelity of implementation was assessed by calculating the proportion of programme objectives covered during sessions that were observed.

	E1	E2	Control group	Significance
Smoking weekly	0.20	0.19	0.27	P<0.05
Alcohol weekly	0.24	0.20	0.29	P <0.05
Marijuana weekly	0.10	0.11	0.14	P<0.05
Marijuana monthly	0.05	0.05	0.09	P<0.05
Polydrug use (all three above)	0.02	0.02	0.06	P<0.01

In this analysis the differences between the groups reach statistical significance.

Based on these figures, the authors conclude that "The magnitude of reduction in weekly polydrug use was relatively large, with both intervention groups having 66% fewer adolescents who used all three drugs at least weekly" and 'Effects of this magnitude could prevent 60,000 to 100,000 tobacco related deaths each year'

Because of the scale of the study, and the way the results are reported, it is worth detailed consideration, which raises some serious methodological and statistical problems that cast considerable doubt on the reported large effects of LST in this and other studies. These problems are concerned with the following issues:

- A. Use of a 'hi-fidelity' sub-sample.
- B. School vs. individual level of analysis: the results are analysed at school rather than individual level but generalised to individual level.
- C. The chosen measure of effect overemphasises the changes due to LST.
- D. The selected measures of drug use: the measures of drug use used may produce confusing or misleading results.
- E. Method of data collection: some data was collected in school, other by phone or mail but no consideration is given to the importance of this.

These problems will now be discussed in greater depth.

Problem A: Use of hi-fidelity sample

Whole sample or selected sub-sample?

Studies, and analyses within studies, differ in whether analysis concentrates on changes in the whole sample, or a high fidelity subgroup that received a high degree of the programme (perhaps with high attrition of high-risk pupils). These differences can have major effects on the size and significance of the effects of the LST programme.

(See Annex 2 – *Statistical Issues* for more on this issue)

In Study 5 the preventive impact on marijuana smoking was found only in a “hi-fidelity” sub-sample, defined as those who received at least 60% of the intended intervention. Since it is unknown whether those pupils who did not receive the programme were high or low risk students, and in practice any real-life implementation of the programme is very likely to be incomplete, the use of a hi-fidelity sample may show how in theory the programme could work, but the results from the full sample may be the ones which are more appropriate to generalise to practice.

Problem B: School vs. individual level of analysis

Which is the appropriate level of analysis: individual pupils or schools?

Since the intervention is always at school level, it can be argued that the statistical analysis should use schools as a unit. The statistical significance depends on the variability between a small number of schools rather than between a large number of individuals.

That means if the programme effect using schools as the level of analysis is non-significant, then variability between schools is important. Where programme effects are found at the level of the individual but not at the level of the school the effect of the programme depends on particular schools.

Use of pupils as a unit can be justified especially since it can take account of different levels of substance use within schools or classes, but tends to inflate significance levels due to the large increase in sample sizes.

For example, one study showed no significant effects using a school-level analysis, but did find significant effects for individual-level analysis (Botvin, Tortu, Baker & Dusenbury 1990).

(See Annex 2 *Statistical Issues* for more discussion on this issue)

For an unexplained reason, Study 4 used individual level analysis, and Study 5, based on same sample three years later, uses school level analysis. When the figures compared are smoking rates for schools, and the sub-samples in each school that fit the hi-fi criterion may be highly variable, generalisation of results even to school level may be suspect. Further generalisation of results to the population of individuals as a whole is even more contentious, which means that the authors’ suggestion of preventing 60,000 to 100,000 tobacco-related deaths each year is very suspect.

Problem C: The chosen measure of effect overemphasises the changes due to LST

The research report, commenting on comparison of LST and control students within the hi-fidelity sub-sample, stated that there were 66% fewer LST students who used cigarettes, alcohol and marijuana at least weekly. The differences were marginally statistically significant for marijuana use using a one-tailed significance test.

When is a 4% difference a 66% difference?

The effect size expressed as a percentage is calculated as follows (See Annex 2 *Statistical Issues* for more discussion of statistical details):

$$\text{Effect size as \%} = (C-E)/C$$

(where C = control prevalence rate and E = experimental prevalence rate).

The larger the control group prevalence rate, the smaller the effect size.

It is not intended to suggest that the difference found between LST students and controls is not statistically significant; that is not in doubt. The point is that the large relative percentage difference (66%) is based on a prevalence rate difference of 0.04 or 4%. The relative difference is large *because* the actual drug use rates were so low.

The apparently impressive 66% difference is calculated by expressing the effect size as a percentage of control group prevalence rates. The mean school prevalence rates for polydrug use are 0.02 for LST students and 0.06 for the controls. In other words the prevalence of this "polydrug use" is relatively rare in both samples and the above figures show a difference of 0.04 i.e. 4% between the groups. Very few students in either LST or control conditions reported the form of "polydrug use" referred to. Presentation of the data using relative percentage differences could be interpreted as reflecting a larger difference in actual terms than was the case.

If the same reasoning were to be used for smoking, then the actual difference (0.19 v. 0.27) is 8% i.e. twice as large as that for polydrug use, but becomes 30% as a percentage of the control prevalence rate. Is LST more or less effective with smoking than polydrug use?

Problem D: The selected measures of drug use

The drug use variables were measured in dichotomous (Yes or No) terms and the percentage for each school calculated. Because it is not possible to infer anything more from a "Yes" response than *at least* weekly use, the extent to which such students used cigarettes, alcohol or marijuana in the period of time referred to cannot be described. Without more detailed reporting of the frequency of use data that were the basis for the recoded dichotomous variables the only safe inference is that these particular students smoked a cigarette once, had one alcoholic drink and smoked marijuana once in the week. Drug consumption at this level would not be of as much concern as more frequent use. In this respect the use of the term "polydrug use" could be misleading if

interpreted as implying use of many substances and/or use being more frequent than the data actually represent.

The reported 25% lower rate in heavy smoking ("pack-a-day") is based on prevalence rates of 0.09 for an LST group and 0.12 for the control group: a difference of 0.03 or 3%. In terms of the harm associated with use of cigarettes, alcohol or cannabis, differences in the desired direction on the *pack-a-day* measure indicate greater potential health improvement than the difference on the polydrug use measure, given that the latter refers to use at least *once per week*.

Problem E: Method of data collection

Turning to the way in which the data were gathered, most of the 3597 followed up completed questionnaires in school classrooms at the end of the 12th grade (17-18 years, N=2574 or 71.6%). The remaining 28% of the sample were either surveyed by phone (N=812 or 22.6%) or by mail (N=211 or 5.8%). It is likely that the demand characteristics of these different data collection methods would be different. The precise nature of the different data collection methods is a moot point, but it is possible that phone or mail respondents were either more constrained in their responses because family members were in the proximity, or they might have been less constrained if family members were not in the proximity when phone calls were received or when postal questionnaires were completed. No analysis is reported based only on the data gathered in the classroom. Although not stated it appears that the biochemical validation technique employed in the classroom setting was not used with the phone and mail respondents.

Summary of Study 5: Six-year follow-up of LST effects.

The LST programme was reported to have long-term preventative effects on smoking, alcohol use, use of marijuana, and multiple drug use. The changes were, however, in absolute terms very small, especially those for marijuana, and much less impressive than the report suggests. Various methodological problems mean that interpretation and generalisation of these results require special care.

Study 6: Six and a half year follow-up

As a further follow-up to Study 5, a sub-sample of 447 individuals were contacted by mail and asked to indicate whether they had used marijuana, heroin and other narcotics, cocaine and other illicit drugs (Botvin, Griffin, Diaz, Scheier, Williams & Epstein 2000).

The sample of 447 represents 12.4% of the sample of 3597 from which they were drawn. No details are given of how this sub-sample of 477 was selected. Given that this study is presented as a 6.5-year follow up, it is worth noting that the sample of 447 represents 7.5% of the original sample that received LST six and a half years previously.

Given the follow-up rate of 7.5% and lack of selection rationale or response rate, extreme caution should be employed in drawing any conclusions about the effectiveness of LST. It can be argued that this study "violates one of the fundamental principles of a randomised control trial" (Gorman 2002), i.e. that the

follow up rate falls very far short of that required to meet the criterion of remaining methodologically sound.

Study 6 Design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 3597 Used in analysis: 447	LST Control	Ever used marijuana, cocaine, heroin, narcotics other than heroin, inhalants, amphetamines, barbiturates, Quaaludes, tranquillisers, LSD or other psychedelics, PCP, ecstasy

Although rates of use were low for most drugs, there was evidence of statistically significant differences between LST and control groups in lifetime use of marijuana, heroin and other narcotics, and hallucinogens. Data were not reported for frequency of drug use, suggesting that there was little use more frequent than 'ever use'. While the proportions of LST and controls that had ever used drugs were low for most drugs cited, marijuana had been used by 46% of the LST students and 55% of the controls, and drugs other than marijuana had been used by 22% of LST group and 30% of the control group. For the latter measure, mean scores were compared (though the report does not make clear what these mean scores were) and differences between groups were highly significant.

Despite the not inconsiderable limitations of the study, the results are interpreted in terms of the gateway effect, and the effect of LST in reducing later use of illicit drugs not dealt with in the programme. To assert as the authors did that the results "support the hypothesis that illicit drug use can be prevented by targeting the use of gateway drugs" indicates undue weight being given to optimism over evidence.

Summary of Study 6: LST and lifetime use of illicit drugs

There were significant reductions in lifetime use of marijuana, heroin and other narcotics, and hallucinogens. While this would appear to be an important finding in terms of the gateway effect, the nature of the data used in the statistical analysis is unclear. Whether this study is evidence for reductions in "gateway drugs" leading to reductions in use of other drugs is not conclusively proven by these data. Moreover, the sample was small. It would be hard to justify generalisation of these findings to the wider population and particularly higher risk groups.

Other studies about specific aspects of LST and cannabis use

There are a number of other studies that measured the effect of LST on marijuana/cannabis use. Different aspects of the programme were assessed:

- peer educators;
- booster sessions;
- whether the programme can be as effective with minority target groups as with white middle class students;
- the gateway hypothesis;
- a recent attempt to target LST at younger age groups; and
- LST and a strengthening families programme.

Study 7: Peer Leaders vs. Teachers

This study (Botvin, Baker, Renick, Filazzola & Botvin 1984) assessed the effectiveness of a 20-session LST programme comparing older peer leaders with regular classroom teachers and a follow-up study (study 8) assessed both peer educators and booster sessions (Botvin, Baker, Filazzola & Botvin 1990).

Study design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 1311 Used in analysis: 1185	LST Peer led 20 sessions LST Teacher led 20 sessions	Monthly/weekly/daily substance use

The peer leaders were trained high school students from the 10th (15-16 years) or 11th grades (16-17 years). The selection criteria were popularity, responsibility, self-confidence, interest in the programme, commitment, and being a good role model.

In a four-month follow-up study, statistically significant differences were found between LST and control students on monthly and weekly measures of marijuana use (Botvin, Baker, Renick, Filazzola & Botvin 1984). Some of the results are shown in Table 4 below that shows 'adjusted mean response proportions' for selected measures in each group. These are based on the sum of two or three dichotomous scales.

Table 4: Adjusted mean response proportions for each group				
	Peers	Teachers	Control	Significance
Smoking monthly	0.15	0.22	0.21	P<0.05
Marijuana monthly	0.02	0.07	0.07	P<0.01
Marijuana weekly	0.01	0.04	0.06	P<0.05

There were differences between the groups on monthly smoking, but not on more frequent (weekly and daily) measures of smoking, suggesting that LST was effective with lighter smokers but not with heavier smokers.

The peer-led group were also found to have greater substance-related knowledge, more anti-drug attitudes, and to be less likely to be influenced by social pressure to smoke, than the teacher-led group.

It is pointed out by the authors, however, that although the peer leaders were more effective than teachers in implementing the programme, the peers had more training and were carefully supervised during its implementation. Every session with the peer leaders was preceded by a detailed briefing session with one of the project staff. Since the previous studies discussed have shown that the effect of LST is related to the fidelity of implementation of the programme, this peer effect is thus likely to be due to better implementation rather than who carried it out.

The summary of results is presented below after discussion of study 8.

Study 8: Peer educators and booster sessions

In a one-year follow-up study of 998 8th grade students (13-14 years) from study 7, the two (peer- and teacher-led) groups were divided into those with booster sessions and those without.

Study Design		
Sample Size	Groups compared	Dependent Variables
Total Sample: 1311 Used in analysis: 998	Peer led Peer led with booster Teacher led Teacher led with booster	Monthly/weekly/daily use of cigarettes, alcohol and marijuana

Some of the results are shown in Table 5 below that shows 'adjusted mean response proportions' for selected measures in each group. These are based on the sum of two or three dichotomous scales.

Table 5: Adjusted mean response proportions for each group						
	Peers	Peer + Booster	Teacher	Teacher + Booster	Control	Significance
Smoking monthly	.31	.12	.26	.34	.23	P<0.01
Alcohol monthly	.40	.39	.39	.55	.38	n.s.
Marijuana monthly	.09	.05	.11	.16	.13	P<0.05

The peer led plus booster condition was more successful than the others (peer led, teacher led, teacher led plus booster, and control). In this study, the peer educators who provided the booster sessions were older, drawn from 10th (15-16 years), 11th (16-17 years) or 12th (17-18 years) grades.

The strongest effects were found with smoking. Amount of alcohol drunk per occasion was reduced and there were fewer who used marijuana in the past month. The other measures did not produce any differences in substance use. All groups improved their tobacco-related knowledge against controls, while the peer led groups showed enhanced alcohol knowledge too. The peer led plus booster condition also produced a positive impact on locus of control. There was considerable shortfall in fidelity of implementation on the part of teachers. Effectiveness of the peer-led group could thus be simply due to their greater supervision and better implementation of the programme. (This evaluation is not cited in the list of published LST evaluation studies on the LST website. It is listed on the website of The Institute for Prevention Research (IPR) at Cornell University Medical Center.)

Summary of results of Studies 7 and 8

These studies showed that the effects of LST were greater with peer-led than with teacher led programmes and that in the longer term, after one year, this effect only occurred if there were additional booster sessions. Unfortunately, both studies report that the implementation of the study was better with peer led groups because of better training and session-by-session supervision by the researchers during the implementation of the programme. It is questionable whether in a real-life implementation (rather than within a research study) that such extra supervision would be viable.

The effects of booster sessions are inconsistent. Two studies (Study 2 and Study 8) have shown no effect of teacher led booster sessions on drug use, but Study 8 showed that peer-led booster sessions were more effective.

Both studies showed booster sessions affected tobacco knowledge, only peer-led booster sessions affected alcohol knowledge.

Studies 9a, 9b, 9c & 9d: Use of LST with minority Groups

A set of studies addressed the issue of programme transferability to ethnic minority groups (Botvin, Schinke, Epstein & Diaz 1994; Botvin, Schinke, Epstein, Diaz & Botvin 1995; Botvin, Epstein, Baker, Diaz & Ifill-Williams 1997; Botvin, Griffin, Diaz & Ifill-Williams 2001).

A 4-month follow-up study of 639 minority 7th grade students (12-13 years) found no difference in terms of drug use, but did find some positive impact on potential mediating variables: intentions to use, attitudes to drug use, and risk-taking. Substance use was low in the intervention and control groups. The sample was described as being comprised of "48% African-American, 37% Latino, 5% White, 3% Asian, and 8% other". This study also compared LST with a culturally focussed intervention programme and found them both to have similar effects (Botvin, Schinke, Epstein & Diaz, and Botvin 1994). The content of the two programmes was the same except for omission of the knowledge component in the culturally focussed intervention. The key difference was in teaching processes. The culturally focussed programme used "live storytelling, video, and peer leaders", with mythical and contemporary stories that demonstrated various skills and their use in high risk situations.

The students were assessed again in a two-year follow-up (Botvin, Schinke, Epstein, Diaz & Botvin and Cardwell, 1995). This 2-year follow-up obtained data by questionnaire from 339 students and by mail or interview from another 117, giving a total of 456. While there were positive effects from both interventions on use of alcohol, there was no effect on marijuana use for either the LST or culturally focussed intervention (CFI) groups. For example, the proportions of "marijuana experimenters" were LST 18%, CFI 20% and controls 19%; whereas the proportions for once a month or more use of alcohol were LST 10%, CFI 6% and controls 13%. Some potential mediating variables were positively influenced: intentions to use, anti-drinking attitudes, refusal assertiveness, and risk-taking. The culturally focussed intervention performed better than LST, indicating that different groups may require programme modifications.

One study of 721 minority students (Botvin, Epstein, Baker, Diaz & Ifill-Williams 1997) reported short-term 3-month follow-up findings of less use of cigarettes, alcohol, and marijuana. In addition, there was impact in the desired direction on potential mediating variables: a) lower normative expectations about adult smoking, peer smoking, adult drinking, and other drug use, and b) refusal skills. The mean scores indicate low levels of substance use in both LST and control groups, e.g. 1.16 and 1.26 for LST and controls respectively for marijuana use, based on a 9-point scale where 1 = "never tried it" and 9 = "more than once a day". This difference in marijuana use rates was just statistically significant ($p=0.0477$). Impact on smoking ($p=0.012$) and drinking ($p=0.017$) was more statistically significant. The ethnic composition of the sample was 26% African-American and 70% Hispanic, with the remainder comprised of White, Asian, Native American and other. The intervention programme was based on LST with some modifications in terms of reading level, illustrative examples and behavioural exercises.

In a later study one-year follow-up data were reported for a larger predominantly African-American sample (Botvin, Griffin, Diaz & Ifill-Williams 2001). The ethnic composition of the sample was 61% African-American, 22% Hispanic, 6% Asian, 6% White, and 5% mixed or other backgrounds. The intervention was based on LST with modifications of illustrative graphics, language, role-play scenarios and reading level. There were positive effects on smoking, drinking and inhalant use in the LST group, but not for marijuana. The strongest effect was on drinking. Two "polydrug use" measures, lifetime and current, were reported as having been positively influenced by LST. However, the polydrug use mean scores for LST and controls in all cases were less than 1, suggesting that polydrug use as the term would be interpreted by most people was rare if not absent. The polydrug use scores represent the number of substances used with a possible range of 0-4. This study also found that LST had a positive impact on potential mediating variables: risk-taking, normative expectations and intentions.

Summary of Studies with Minority Groups (Studies 9a - 9d)

Taking these studies together the picture that emerges is of limited or minor but statistically significant effects on smoking, drinking and other drug use (in most cases marijuana). The impact on smoking and drinking is stronger than on cannabis. These effects were not always found. The studies demonstrate that positive effects are not confined to white middle-class students and that effects can be found some years after intervention.

STUDY 10: LST and The Gateway Theory

This study examined the relationship between LST and the sequence of drug use stages and provides some insight into LST and the gateway theory.

Scheier, Botvin & Griffin (2001) used advanced regression analysis to predict later drug use from previous drug use and LST experience. They found limited support for Kandel's stage sequential model of early drug use (Kandel & Faust 1975, Kandel & Logan 1984). There was evidence for cigarette smoking being associated with both later alcohol use and multiple use (tobacco, alcohol & marijuana). There was also evidence for alcohol use being associated with later multiple use. The extent to which the LST intervention influenced the factors believed to mediate drug use (this study focussed on social competence) is very limited. There was evidence of an effect of LST on social competence and for subsequent reductions in substance use, with the stronger effects on cigarette and alcohol use than on marijuana use. There was little variance in marijuana use explained by LST.

Summary of results of Study 10

The analysis in this study does give some evidence for the gateway hypothesis in terms of links between smoking and drinking and later illicit drug use. It gives minimal support for the relevance of the LST programme in the equation, since although later marijuana use/non-use could be predicted from earlier smoking and alcohol use, it could not be predicted from being subjected to the LST programme.

Study 11: Targeting LST at younger age groups

New research has reported the effects of a modified version of LST for elementary (primary) school pupils (Botvin, Griffin, Paul & Macaulay, in press). Impact data were collected after one year of the intervention, i.e. before the delivery of booster sessions.

This study reported a reduction in the proportion that smoked in the last year and less frequent smoking in LST pupils, compared with controls, when the data were analysed at the level of the school (see box "Which is the appropriate level of analysis: individual pupils or schools?"). The intervention group also had higher levels of self-esteem.

Contrary to academic convention results that approached statistical significance were presented as significant, enhancing the apparent effectiveness of the programme. Unfortunately due to constraints in the research methodology it was not possible to comment on possible differential effects by age or grade level, nor was it possible to comment on possible ethnic differences although the sample studied was more ethnically diverse than most LST evaluation samples.

Summary of Study 11

This study showed that the LST programme could be implemented with primary school children, and that this could affect smoking one year later, as well as levels of self-esteem.

Study 12: LST and family involvement

A recent research report, that was not authored by Dr Botvin, assessed the impact of LST in conjunction with and in contrast to a strengthening families programme (Spath, Redmond, Trudeau, & Shin 2002). Impact data were gathered one year after intervention. The intervention was in 7th grade (12-13 years) in 36 schools. There were 1664 students in the original sample, but 1372 in the follow-up. Some students had booster sessions but the analyses do not take this into account.

This study reported that the rate of onset of any substance use in the intervention groups (LST only and LST plus the strengthening families programme) was less than that in a control group. For marijuana, LST only and LST plus the strengthening families programme the rate of onset was the same. For alcohol the combined intervention was more effective compared with the control group, but the LST only condition produced no difference. However, the data are interpreted using relative percentage differences. For example, the impact on marijuana shows absolute changes of 3.6% (LST only) and 3.8% (combined intervention) but these are presented as relative changes of 45.6% and 48.1%.

Summary of Study 12

This independent study confirms the results of the Botvin studies, but is still subject to similar methodological problems in terms of attrition of subjects, choice of response measures, and interpretation of data.

While the addition of family involvement had no effect on marijuana use, it did produce fewer new alcohol users.

Chapter summary

The focus in this chapter has been the research reports that included measures of illicit drug use. There are several other papers that concentrate on cigarette smoking and alcohol. While these reports were in the main excluded some of the early studies were described above to illustrate the origins of LST evaluations 20 years ago. Taking the reports reviewed above that include measures of cigarette smoking, alcohol and cannabis use and the other reports that focus on cigarettes and/or alcohol it could be argued that the impact on smoking and some aspects of alcohol consumption are useful outcomes in themselves. The programme can have positive impact but requires considerable completeness in delivery.

This section has identified the nature and scale of drug-related effects attributable to LST. There are positive effects of LST on illicit drug use, made more likely by relatively complete delivery.

What does the literature tell us about LST and prevention?

There is no doubt that LST has some effects. In the main these effects are relatively minor in relation to the numbers of individuals influenced and relatively unclear in relation to the precise effects on drug patterns.

The research base is comprised of studies that are accounts of evaluations that are generally methodologically sound. There are some methodological issues that detract from being able to make more complete inferences from the data, in particular the issue of unit of analysis. Schools were allocated to conditions randomly, but analyses have usually focussed on the level of the pupil. Moreover, with the longer-term studies there are problems with the selection of samples for analysis.

There is only limited evidence for the importance of booster sessions. One study showed effects of booster sessions on potential mediating variables, but not on smoking. Another study showed effects for booster sessions for peer-led delivery, but not for teacher-led delivery.

The scale and nature of the effects on substance use are stronger and fairly consistent for cigarette and in some cases alcohol. Impact on cannabis use has been achieved in some cases, but the link between LST and prevention of cannabis use is less clear than between LST and prevention of cigarette smoking. The scale of impact is often presented in terms that could be interpreted as exaggerating the impact of LST.

Nonetheless, LST can produce positive results. The effects can be obtained with white middle class, African-American and Latino groups. The results may not be large at the level of the individual school, but could be considered useful at a general population level particularly in relation to cigarette smoking. But are these results easy to bring about and are they easy to roll out to the wider school population?

The LST programme has been tested in a number of settings and with different groups over varying lengths of time. There is sufficient variability in findings (e.g. finding positive effects with a peer led plus booster condition but not with a teacher led plus booster condition) to raise some doubt about how generalisable the positive effects would be with groups led by teachers or others whose own training was not ideal.

Some questions are raised by these studies about the relation between effect of LST and changes in the hypothesised underlying mediating variables. This will be examined in the Chapter 4.

CHAPTER 4: PROCESS FACTORS – WHAT MEDIATES THE SUCCESS OF LST?

The factors that underlie the effectiveness of the Life Skills programme can be looked at in two ways. Firstly what are the mediating variables that result in its effectiveness? And secondly what are the practical measures that have to be implemented to maximise effectiveness?

Mediating variables

A wide range of variables which are assumed to relate to the effect of the LST programme have been measured. Table 1 identifies the studies that have shown significant or non-significant differences between intervention and control groups. The spread of studies across the two columns in Table 1 is very revealing about the weight of evidence for mediating variables.

The numbers in the cells are the index numbers of the studies in the list of papers reviewed for inclusion (see Annex 1).

Table 6: Variables Showing Significant And Non-Significant Effects Between Life Skills And Control Groups		
Variable	Significant Differences	Non – significant differences
Knowledge	1, 3, 11, 12, 13, 14, 15, 16, 18, 20, 21, 36	10
Attitudes	1, 3, 9, 10, 13, 14, 16, 18, 20	6, 11, 15
Normative expectations	1, 3, 6, 9, 11, 12, 13, 15	10
Assertiveness		3, 10, 12, 14, 15, 16, 40
Social assertiveness		6
Refusal assertiveness	3, 6, 9, 40	
Self esteem	36	9, 10, 12, 14, 15, 16, 20
Decision making	16	3, 6, 10, 12, 15,
Risk taking	3, 9, 10	16
Locus of control		14, 18, 20,21,36
Life skills		9, 10, 13, 16
Social anxiety	12, 20, 21	3, 6, 14, 18
Social efficacy		9, 10, 12, 15,16
Influenceability	20	14, 18, 21

Three intra-personal variables are highlighted by the above table as showing positive effects of LST:

- Knowledge of drugs**, which has most universally been shown to have changed as a consequence of the programme.
- Attitudes to drugs** has also almost universally been shown to differ between intervention and control groups.
- Normative expectations** for adults and peers is the third variable which consistently shows effects. Children's views of amount of drug taking by adults and peers do appear to be affected by the intervention.

None of these variables are specifically related to life skills. The aim of the Life Skills programme is to teach students

“a variety of cognitive-behavioural skills for building self esteem, resisting advertising pressure, managing anxiety, communicating effectively, developing social relationships, and asserting one’s rights” (Botvin, Griffin, Diaz and Ifill-Williams 2001).

A number of variables which are directly related to life skills programmes have been investigated with much inconsistent or negative results.

General assertiveness or social assertiveness have been shown in many studies not to be affected by the programme, but in some later studies which investigate **refusal assertiveness** this does appear to change.

Those studies which have measured ‘**life skills**’ have shown no significant changes with the programme. **Self esteem**, which is one of the variables assumed to mediate the effect of life skills training, consistently shows no effects. Similarly **locus of control** and **social efficacy** are not affected by the programmes and **social anxiety** and **influenceability** show inconsistent results.

When Scheier, Botvin and Griffin (2001) did structured equation analysis using the LST programme and other variables to produce the best prediction of later drug use, they found that marijuana use was related to earlier alcohol and cigarette use, and also to assertiveness skills (especially refusal assertiveness), but also showed that taking part in the LST programme had minimum predictive weight.

In general it appears that the effect of the LST programme is mediated by changes in knowledge of drugs, and normative expectations, and changes in attitudes rather than more general life skills. When the programme is effective, it does not appear to be for the reasons proposed.

Comparisons have been made with groups who received an information only intervention without the life skills training (Botvin, Schinke, Epstein and Diaz 1994). These comparisons showed that the LST programme is more effective. It may be the case therefore that what is important is the transmission of knowledge and changes in attitudes, but that these are best implemented in the context of a life skills programme. The LST programme may thus be effective mainly because it is interactive rather than non-interactive (c.f. Tobler and Stratton, 1997).

The LST intervention is predicated on the idea that there is a need to positively influence intra-personal factors such as self-esteem and aspects of social competence such as self-efficacy. Yet there is little evidence to support this in this literature. There is more support for the mediating role of knowledge acquisition and attitudes change.

What factors make the programme most effective?

- Duration of programme

One over-arching finding is that the programme requires considerable time and support to maximise its modest effects. The basic curriculum of 15 lessons is delivered in one school year or part year (to 7th grade, 12-13 year olds), followed by 15 booster sessions during the following two years. While direct training is not essential to effective delivery, it appears that the programme is best delivered in its entirety as intended by its designer. Booster sessions may be important for achieving the potential of LST. It is not clear *how* these booster sessions enhance LST effects. An early investigation which studied the booster sessions (Botvin, Eng & Williams 1980) failed to find any significant effect on smoking. In addition Botvin, Baker, Filazzola & Botvin (1990) found that booster sessions were effective with peer providers, but not with teachers.

- Fidelity of implementation

The programme is effective only if pupils have attended at least 60% of the sessions.

In one of the most substantial evaluations of long-term follow-up many of the positive effects were only found in sub-groups that had received relatively complete programme delivery. This is likely to have implications for delivering LST to the wider community of young people. A 30-session programme over three years that requires to be delivered in an ideal manner could find itself subject to a range of competing pressures. In other words, to the extent the programme works it requires to be delivered in its entirety, or close to entirety. That is a considerable commitment in school staff time. The realities of school life – such as, time pressures on staff and pupils and curriculum congestion – may make relatively complete delivery over the three years difficult to achieve.

Most of the Botvin studies have measured attrition rates in control and experimental groups and found that there is a bigger loss of pupils amongst the high smokers/drinkers/drug users.

While the 6-year follow-up study (Botvin, Baker, Dusenbury, Botvin & Diaz (1995) found no differences in attrition related to substance use, several other studies did find higher attrition rates in relation to substance use and risk-taking. There was higher attrition among:

- smokers, drinkers and marijuana users and those who smoked marijuana to “get high” (Botvin, Griffin, Diaz & Ifill-Williams 2001);
- higher risk binge drinkers (Botvin, Griffiths, Diz & Ifill-Williams 2001);
- marijuana users in information only control group (Botvin, Schinke, Epstein, Diaz & Botvin 1995); and
- high risk individuals (Botvin, Baker, Dusenbury, Tortu & Botvin (1990).

Since the programme may be largely aimed at these higher risk groups, effectiveness is dependent on making sure that these critical pupils do experience a large amount of the programme.

- Training of the teachers

Success of the programme is highly dependent on the training of the teachers. Tortu and Botvin (1989) give a detailed discussion of a large number of

components that are necessary for successful implementation of the programme. These include:

- **Teachers' understanding of theory behind programme.** Understanding the theoretical basis for LST is considered to be the necessary foundation upon which the other training elements will be built. It is also suggested that teachers need to be motivated and enthusiastic about the intervention and to be able to transfer this to the classroom.
- **Skills in implementing programme.** It is considered necessary that, prior to implementation, teachers are themselves able to perform the skills that students are expected to master: including physical and cognitive techniques for anxiety reduction, decision-making strategies, refusal and assertiveness skills, and communication skills. Moreover, teachers are expected to have the skills to help students acquire the necessary personal and social skills: role-playing, facilitation of discussions, and classroom coaching. Tortu & Botvin (1989) consider that time should be found for teachers to practice complex social skills such as assertiveness.
- **Feedback.** Teachers should be given feedback on their practice efforts by trainers, preferably immediately after practice. Also, structured feedback around components of complex skills should be given. Teachers should be observed by trainers during their first experiences with delivering the programme and given feedback on their performance.
- **Coaching.** Teachers should be helped to analyse how to teach different aspects of the programme's content. Trainers and teachers should collaborate on development of plans to deal with student reactions to the programme.

While there is some evidence that use of video rather than workshops may be equally effective, it appears that there could be substantial training implications in order to maximise effectiveness. One study (Botvin, Baker, Renick, Filozola, and Botvin 1984) showed that peers were more effective than teachers in implementing the programme. These peers had more training and were carefully supervised session by session during implementation. This effect is thus likely to be due to the better implementation rather than who carried it out.

CHAPTER 5: CULTURAL DIFFERENCES AND TRANSFERABILITY

The purpose of this report is to review the research into the effectiveness of LST and to comment on the implications of the evidence. The research base for LST provides only limited insights into cultural differences and transferability. It is beyond the remit of this report to consider how LST could be implemented in Scotland or the UK. Some comments, however, can be made about certain aspects of cultural differences and transferability.

The research shows that preventive effects can be found with white middle-class students and with minority groups such as African-Americans and Latinos, with culturally-specific modifications in some cases. The characteristics wrapped up in these terms are multi-faceted. The white middle-class groups may have more 'traditional' social structures (such as participation in organised religion). The minority groups were both ethnically and culturally different, they were also from a lower socio-economic group.

However, that is not a sound basis on which to conclude that LST would work in Scotland. It is a moot point whether the programme elements and cultural adjustments that appear to have worked with these different groups in the USA indicate that the programme would successfully transfer to deprived or non-deprived communities in Scotland.

There are likely to be differences in youth culture, drug use patterns and attitudes towards drug use. While globalisation of American economic and cultural phenomena seems likely to reduce cultural differences between here and there, there is much that is likely to remain different: for example, general social attitudes, attitudes to authority and institutions, attitudes to health education communications, and attitudes to drugs and drug users.

According to Parker, Aldridge & Egginton (2001) the UK now has the most drug-experienced population in Europe and in many ways the UK has 'caught up' with the USA. While there are some differences in relation to drug preferences and the age structure of drug-using populations, Parker *et al* contend that the UK has roughly the same scale of drug involvement as the USA. Moreover, current trends imply that the UK may overtake the USA in relation to recreational drug use.

It is also necessary to consider the differences in drug use patterns and attitudes to different drugs within the UK. The growing cultural normalisation of recreational drug use – that is, acceptance of recreational drug use by both users and many non-users – indicates that there are likely to be differences in the way that young people perceive drugs and their relative dangers (e.g. Perri 6 *et al* 1997). There will be many young people who use drugs recreationally in a controlled way and not progress to problematic dysfunctional use of heroin or cocaine.

This has implications for the normative expectations element in LST. When the proportion of the population that experiments with, say, cannabis is a minority then inculcating more accurate normative expectations should – as has been found in LST research – reduce individuals' own normative expectations. If, however, the proportion that experiments with cannabis is high then increasing knowledge of this issue is less likely to prevent cannabis use.

This is not to say that a programme such as LST has no place. Rather, the point is that expectations of effectiveness have to be realistic. It is not possible to

discern from the LST evaluations whether it has an impact in terms of less risky use, as opposed to abstinence. This is confounded by the fact that, given the age of those in the research samples, the substances addressed are tobacco, alcohol and cannabis and that frequency of use is not reported.

It is also important to recognise the limitations of the drug education programmes, including LST, that have the most potential on the basis of the available evidence. The Rand organisation calculated the potential impact of these state of the art programmes were they to be implemented throughout the USA. Among their conclusions was the sobering point that if implemented nationwide the reduction in cocaine use after ten years would be 2.5% (Caulkins *et al* 1999).

Despite targeting life skills as mediating factors, LST has remarkably little or no impact on these. Without a better knowledge of why LST produces the effects it has it is difficult to predict its impact on UK targets. Surprisingly, knowledge is one intra-personal factor that consistently shows enhancement in LST evaluations, yet information-based drug education interventions tend to have a neutral effect on drug use when measured in terms of primary prevention.

LST appears to work mainly because of the interactive nature of its teaching and learning processes (see *Process Variables* above). It may thus not be going too far to say that a variation of LST, culturally appropriate to Scotland/UK, could produce similar effects if the key ingredient is interactivity. Certainly, the Scottish educational system would find these teaching and learning processes consonant with aspects of the domestic educational ethos.

On the one hand, the Scottish education system places importance on health education and personal and social development. Moreover, Scottish schools have long embraced the educational goals of enhanced social competence. On the other hand, there are a number of social and cultural factors that may present barriers to successful implementation of a Scottish version of this programme. Would what works in a USA setting work in Scotland with appropriate modification? The evidence reviewed in Chapters 3 and 4 indicates that the answer to that question is probably yes, but the evidence also indicates that a major impact on drug use or drug problems in particular should not be expected.

CHAPTER 6: KEY FINDINGS AND CONCLUSIONS

Does LST work?

1. **LST can have durable preventive effects on cannabis use if delivered relatively completely, but these effects are small in scale.** For example, there were 4% fewer cannabis users among LST students in a six-year follow up study, measured in terms of weekly or monthly use, in a selected “hi-fidelity” sub-sample who received at least 60% of the programme. However, there was no statistically significant effect on cannabis use in the whole sample, including those who received less than 60% of the programme.
2. **LST had positive effects on reducing the numbers of those who used more than one of cigarettes, alcohol and cannabis.** These effects were more consistently found in the sub-sample who had received more complete programme delivery. Across the various measures of combinations of cigarettes, alcohol and cannabis, the percentage reductions ranged from 3% to 8%.
3. **There was some evidence of preventive effects on a wider range of drugs in a 6.5-year follow-up study.** After statistical adjustment for school-level intra-cluster correlations there were statistically significantly fewer LST students who reported use of heroin and other narcotics, or hallucinogens. Similar reductions were found with composite measures of drug use: “total illicit substance use” and “total illicit other than marijuana”, but no details were reported about the nature of this total use. There is doubt over the methodological soundness of this study, because it followed up only 7.5% of the original cohort and no selection rationale is given.
4. **Effects on tobacco and alcohol, while not covered in detail in this review, can be positive if relatively modest in scale.** There was some evidence that positive impact of LST on alcohol and smoking could reduce likelihood of progression, but the data were not conclusive. The view could be taken that preventing smoking is a desirable end in itself.
5. The data and statistical analyses are limited in what they tell us. **There are problems with level of analysis.** For example, reporting analyses not corrected for intra-cluster correlations (ICCs) within schools as well as analyses corrected for ICCs and basing conclusions on both sets of analyses, rather than focussing only on the type of analysis that makes the appropriate corrections.

The fact that school-level analysis tends to be non-significant and individual-level analysis is only significant if variability between schools is controlled for statistically suggests that school differences, which may reflect fidelity of implementation, are very important. In other words, whether the programme works depends on which school the students are in.

There are also problems of comparability of data across studies, with rating scale responses being dichotomised in later studies. Such loss of detail about patterns of drug use prevents greater understanding of the patterns of drug use within the samples and the nature of LST effects on these different patterns. This suggests that statistically significant differences are to be found only when the data are analysed in this way.

6. The findings are compromised to some extent by various shortcomings (often found in social research of this nature). **There was substantial attrition in longitudinal studies**, which could bias the findings in favour of LST. Moreover, there were differential data collection methods, such as by mail or interview when students were hard to follow-up.

It is not clear how LST impacts on the substantial numbers lost to attrition in long-term follow-ups. It could be argued that this is an important sub-group in which to assess LST.

7. **Ecological validity, or would LST work in real life as opposed to a research setting?** In arriving at a view on the ecological validity of the LST research findings, several factors, at least, should be taken into consideration. First, can findings from initiatives closely supervised by programme personnel be generalised to a wider population in which it is possible, if not likely, that the integrity of delivery would diminish. It is clear that there would be pressures on programme delivery and therefore on its integrity of delivery. So it is possible, if not likely, that the research does not indicate ecological validity in this respect.

Second, is the research ecologically valid in terms of its potential to influence patterns of drug use in the wider community of young people? Moreover, does this extend to Scottish young people? A number of factors will bear upon this issue. The nature and scale of substance use in the intervention and control groups was at the less problematic end of the spectrum. There was also evidence from long-term follow-up that differences in drug experimentation were not great between intervention and control groups. There was considerable attrition in the samples followed-up long term and, given a bigger loss of pupils amongst the high smokers/drinkers/drug users in several studies, there remains the possibility that those lost to follow-up could be more likely to use substances. So, the effects of LST may not extend to those young people who are heavier users or are at risk due to other risk factors outwith the scope of the intervention.

Third, the finding that the effects of LST are significant only when variables such as gender and school are statistically controlled for - and such variables are never controlled for in real world delivery of programmes - means that the programme may work in theory and not in practice. The generalisability to real life practice is reduced by use of the particular statistical test used in these evaluations (covariance and regression analyses).

There is also the issue of potentially different attitudes to drug use in the USA compared with Scotland. There is some evidence in the UK that recreational drug use is seen as relatively normal behaviour even among those who do not use drugs. Whether this reflects a cultural difference is a moot point and may be less important than whether such accepting attitudes reflect a barrier to the extension of the impact of LST even when delivered in an ideal manner.

How does LST work?

8. **There was little evidence that the programme achieved its substance use reductions by affecting intra-personal factors hypothesised to mediate drug use, such as self-esteem and social competence.** It appears that the positive effects are more likely mediated by knowledge acquisition and influence on attitudes.

The role of mediating variables (e.g. self-esteem, self-efficacy and other aspects of social competence) is unclear except insofar as there is little and conflicting evidence that these were important factors in the samples researched. There may be an interaction between social competence and attitudes towards drug use that could predict greater likelihood of substance use.

There could be different reasons for this. It could be that LST reinforces the negative aspects of substance use among those who are less likely to develop problematic patterns of use. It could also be that high self-esteem and good social competence are no barriers to substance use.

Thus, despite the underlying theory being persuasive, there is little empirical support for it in the studies reviewed here.

Given the low levels of drug reported (as indicated by mean scores of frequency measures) it is not possible to draw conclusions about harm reduction effects, i.e. less risky use, as opposed to primary prevention effects, i.e. abstinence. It is possible that LST could have utility in terms of harm reduction, but that remains an empirical question.

9. A well-implemented LST programme can positively affect knowledge, attitudes and behaviour with respect to smoking and alcohol. There is limited evidence of similar effects for cannabis or other illicit drugs.

The reason for these effects may be due largely to changes in knowledge and attitudes rather than the acquisition of life skills. Nonetheless, the interactive nature of the LST programme may provide one of the better ways of facilitating knowledge acquisition and attitude change.

Is impact mediated by the processes of delivery?

10. Booster sessions are argued to be an important element in maximising impact of LST, but have little empirical support.

11. Teachers and older peer educators can successfully deliver LST, but the evidence for this is not entirely consistent.

12. Different teacher training modalities showed little difference in terms of impacts on students. More intensive direct training with implementation feedback was compared with a two-hour video with no implementation feedback.

13. Completeness and fidelity of delivery are also important to maximising the impact of LST. The need for this is illustrated by the greater tendency to find positive impact with young people who had received more than 60% of the programme. This raises concerns about the practicality of roll out to all young people, because of competing demands on curriculum time.

This has serious implications for programme delivery as part of the school curriculum by non-specialist teachers.

14. LST teaching and learning processes are interactive and participative.

Such approaches are used extensively in Scotland and the UK. There is evidence from meta-analysis (Tobler & Stratton 1997: which also cites LST as one of the more effective programmes) that these interactive methods are

superior in terms of preventive impact when compared with more didactic approaches.

Gaps in knowledge

15. There are a number of gaps in knowledge of LST and its effects.

It should be noted that **LST has been studied relatively extensively compared with many other drug education interventions.** While criticisms can be directed at aspects of the evaluations of the programme, the research has highlighted a number of issues of importance for development and delivery. This is an argument for more detailed long-term evaluations of drug education interventions.

The body of research over the 20-year period has explored most aspects of training, delivery and mediating variables. Gaps in knowledge are mainly due to inconclusive results rather than lack of investigation.

As awareness of drugs issues increases, and as attitudes to drugs change (e.g. if cannabis is re-classified would there be a change in attitudes to cannabis?) a greater differentiation of attitudes to drugs might develop. It may be that more differentiated attitudes to drugs have already developed. Either way, and in relation to a drug education programme that has not changed substantially in 20 years, what worked in some cases in the past might not work in the future.

If recreational drug use, as opposed to dysfunctional/problematic drug use is more acceptable even to young non-drug users, LST may not be as effective. There is a need to consider the interplay between attitudes to drugs and programme effectiveness. There is limited detail on drug-related attitudes in the reports.

Finally, it is not clear which aspects of the LST programme are essential for effectiveness. The interactive element is clearly important, but it is not clear that the sessions dealing with, for example, self-esteem and social competence are essential of this. In other words, while such sessions may not enhance, say, self-esteem, these sessions may indirectly facilitate the effectiveness of the programme.

Conclusions

The Life Skills Training programme can have statistically significant and durable preventive effects on substance use onset rates though the size of these effects is consistently small. The set of research reports provide many insights into the limited scale of the preventive effect, as well as insights into *how* the programme works.

LST does not, on the available evidence, work in the way that is expected; that is, by enhancing the social and psychological factors believed to promote substance use/abuse. Rather, LST appears to work largely by influencing drug-related knowledge, attitudes and normative expectations, in the context of interactive teaching and learning methods. It may be that the key mechanism by which it achieves its limited success has yet to be identified.

Quality, fidelity and duration of implementation are important. Quality of training for LST providers is a consistent indicator of better impact. The programme is more effective if pupils participate in at least 60% of the sessions. Attrition in the research samples could mask lack of impact on those more at risk.

The programme can have statistically significant positive effects on substance use onset rates. However, to describe these effects as "highly effective" (as is done in LST promotional material) is to overstate the degree of effectiveness. When such promotional statements are supported with other statements using relative percentage differences rather than absolute percentage differences many observers will conclude that the programme is more effective than it actually is.

Nonetheless, it can be argued that expectations of drug education have been unrealistically high. The research on LST demonstrates that onset can be reduced or delayed in some young people. While it seems unlikely that LST, or any other universal primary prevention programme, could have a major impact on drug use and especially drug problems, it is one of the few programmes for which there is research evidence of limited positive impact.

On a small scale at school level, the effects of LST are likely to be very small. On a large scale, e.g. nationwide, the small effects may mean there is a measurable reduction in drug users in absolute terms, but the question arises as to whether the costs and resources required for training and implementation to make this work for a small number of cases would be justified.

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ANNEX 1

Papers reviewed for inclusion

Various sources were contacted for literature to review, listed below.

1. Contact was made with Dr Botvin's organisation, Institute for Prevention Research at Cornell University. This organisation also provides information via their website, including a list of evaluation papers. Recently the internet promotion of LST services was changed to National Health Promotion Associates Inc. In addition to establishing that the list of papers was complete, Dr Botvin's associates were helpful in providing copies of in press material.
2. The following databases were searched:
 - EMBASE
 - Web of Science (Science Citation Index, Social Science Citation Index, Arts & Humanities Citation Index)
 - ERIC & International ERIC
 - Sociological Abstracts
 - MEDLINE
 - ASSIA
 - DrugScope (formerly ISDD)

Over 300 hits were accumulated but there was a considerable amount of duplication across databases. Scrutiny of abstracts further reduced the number (in relation to the inclusion and exclusion criteria).

3. Requests for research reports or details of any known research reports were sent to:
 - National Institute for Drug Abuse (NIDA)
 - The Substance Abuse and Mental Health Services Administration (SAMHSA)
 - The Brown University Center for Alcohol and Addictions Studies
 - The Center for Prevention Research at the University of Kentucky
 - The Center for Substance Abuse Research (CESAR) University of Maryland
 - Drug Strategies, Washington
 - Higher Education Center for Alcohol and Other Drug Prevention, US
 - Department of Health and Human Services, US
 - National Institute of Justice
 - The Drug Abuse Research Center, UCLA
 - The White House Office of National Drug Control Policy (ONDCP)

	Authors, title, journal etc.
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22.	Caulkins, J.P. et al (1999) <i>An ounce of prevention. A pound of uncertainty. The cost-effectiveness of school-based drug prevention programs.</i> RAND. **
23.	Drug Strategies. (1999) <i>Making the grade: a guide to school drug prevention programs.</i> Washington DC: Drug Strategies. **
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ANNEX 2

Statistical Issues

Measures of Effect of the Intervention

Comparison of the various studies of the effect of the Life skills programme shows that several variables are used as measures of the effect of the programme. These include overall effect of the programme on all users, the difference in percentage of pupils at extreme end of the distribution, and the relative differences in percentages. These measures will be outlined below and the effect of choice of one or the other compared.

Overall effect of the programme on all users

When a measure of amount of drug taking, attitudes, knowledge, etc., is obtained from a large sample, typically this will produce a normal distribution of scores for programme and control groups. In the meta-analysis of the effect of a large number of drug programmes, Tobler and Stratton (1997) indicated that the typical effect of an interactive programme such as the Life Skills programme is to shift the distribution by about .20 standard deviations. This is a standard method of measuring the magnitude of effects. Such a shift is depicted in Figure 1 below.

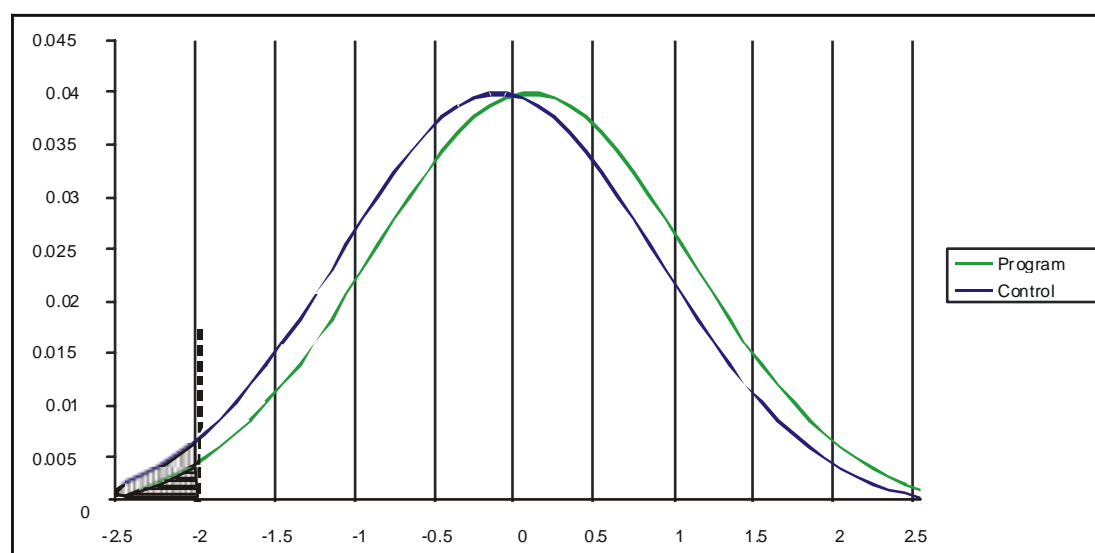


Figure 1 Distributions with shift of .20 standard deviations

If a sample of several thousand children is used, as in many of the studies by Botvin, such a difference, though small will be highly statistically significant. Tobler and Stratton (1997) found that the effect on marijuana use is typically much less ($= .14$).

Difference in percentage of pupils at extreme end of the distribution

It may be considered, however, that the most important effects are not for the whole sample, but in terms of the changes in number heavy drug users rather than the effects on those who are already minimum users. For this reason one can make comparisons of the percentage of pupils below a cut-off point at the extreme end of the distribution. For example, with a cut-off point at -2.0 in the

above distribution, this will include 2.3% of Programme group and 3.6% of Control, a reduction of 1.3% in heavy drug takers. If the cut-off point were at -1.5, the respective figures would be 6.7%, 9.7% with a difference of 3%. Such figures also show that the programme has only a small effect with the critical pupils. The more extreme the cut-off point the smaller the differences in percentages. Due to the nature of the statistical tests, comparison of these small percentages is much less likely to be significant than comparisons of whole distributions.

Relative differences in percentages

The above figures can however be looked at in a third way which is the relative change in percentages which is defined as $(\%C - \%E) / \%E \times 100$. A cut-off point of -1.5 thus shows a change of $(3.6 - 2.3) / 3.6 \times 100$ which is equal to 37%, and a cut-off at -1.50 similarly shows a relative change of 31%. The apparent effect of the programme is thus much larger, and the more extreme the cut-off point, the larger the effect of the programme appears to be. This means that on this measure the effects on high marijuana use will appear to be greater than high smoking since the latter is more common. Note that all these figures refer to the same change in distribution of scores.

Some studies (e.g. Botvin, Baker, Renick, Filozzola and Botvin (1984) compare the whole distributions for the purpose of carrying out tests of statistical significance, but do not mention the magnitude of the overall effect, and use the relative percentage changes in discussing the effect of the programme. This maximises the apparent effect of the programme. It is not the case that one or other of these measures is more correct or incorrect, but it does mean that care must be taken in interpreting the size of small programme effects.

Which is the appropriate level of analysis: individual pupils or schools?

Since the intervention is always at school level, it can be argued that the statistical analysis should use schools as a unit. The statistical significance depends on the variability between a small number of schools rather than between a large number of individuals. That means, if the school effect is non-significant, it means variability between schools is important. The effect of the programme depends on particular schools. This, however, means that the variability within schools is not taken into account. In addition, this may also mean, as with the six-year follow-up by Botvin, Baker, Dusenbury, Botvin and Diaz (1995), that the score used is the proportion of pupils who achieve a single selected level of drug use.

Use of pupils as a unit can be justified especially since it can take account of different levels of substance use within schools or classes, and allow comparisons of effect for different subgroups, but this tends to inflate significance levels due to the large increase (e.g. from 56 to 3579 in sample sizes). Botvin, Tortu, Baker and Dusenbury (1990) found no significant effects for school level analysis but did find effects for individual level analysis. This is one of the few studies that does quote both levels of analysis.

Methods of Statistical Analysis

The methods of statistical analysis can vary from simple frequency analysis to highly sophisticated multivariate analysis (GLM ANCOVA, logistic regression) where a large number of variables (pretest scores, gender, school, area) are

statistically controlled or filtered out. The latter usually increases statistical significance but can mean that the data compared in the statistical analysis is considerably different from the descriptive data quoted in the text, or that the statistically corrected data in the tables does not give the actual obtained rates in the study. It is often not clear whether the results are significant only if the complex statistical corrections are included. The co-variance analysis makes a statistical assumption that variables such as gender and school are uncontrolled error rather than important variables. In the study by Botvin, Griffin, Diaz, Scheier, Williams and Epstein (2000) the results are significant for the non-refined analysis but not for the more sophisticated SEE analysis, which is described as more conservative rather than more accurate and given less weight in the discussion.

Though the unit for allocation of pupils to groups is schools, the unit for analysis of data is usually pupils. Due to the increased sample sizes, this tends to inflate significance levels compared with using schools as the unit for analysis.

Caveat

Taking the above issues into account, great care must be taken in interpreting both the size and the significance of effects in many of the research studies.

ANNEX 3

Ratings scales and response options

The ratings scales and response options listed below were reported in

Botvin, G.J., Baker, E., Dusenbury, L., Tortu, S., and Botvin, E.M. (1990). Preventing adolescent drug abuse through a multimodal cognitive-behavioral approach: Results of a three-year study. *Journal of Consulting and Clinical Psychology*, **58**(4), 437-446.

Cigarette smoking

A 10-point scale to measure current smoking status.

1 = never, 2 = not in the last 12 months, 3 = a few times in the last 12 months, 4 = usually once a month, 5 = a few times a month, 6 = usually once a week, 7 = a few times each week, 8 = a few times most days, 9 = about half a pack each day, 10 = more than a pack a day.

Alcohol use

Three scales to measure a) frequency of drinking alcohol, b) amount consumed per drinking occasion, and c) frequency of getting drunk.

9-point scale to measure frequency of drinking alcohol

1 = never, 2 = tried them but don't drink now, 3 = less than once a month, 4 = about once a month, 5 = about two or three times a month, 6 = about once a week, 7 = a few times a week, 8 = about once a day, 9 = more than once a day.

6-point scale to measure amount consumed per drinking occasion

1 = don't drink, 2 = one drink, 3 = two drinks, 4 = three or four drinks, 5 = five or six drinks, 6 = more than six drinks.

9-point scale to measure frequency of getting drunk

1 = don't drink, 2 = drink but never get drunk, 3 = less than once a month, 4 = about once a month, 5 = about two or three times a month, 6 = about once a week, 7 = a few times a week, 8 = about once a day, 9 = more than once a day.

Marijuana use

9-point scale to measure frequency of marijuana use

1 = never tried it, 2 = tried it but don't use it now, 3 = less than once a month, 4 = about once a month, 5 = about two or three times a month, 6 = about once a week, 7 = a few times a week, 8 = about once a day, 9 = more than once a day