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REVIEW

Educating young people about drugs: a systematic review

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Abstract

Aims. *To assess the effectiveness of interventions directed at the prevention or reduction of use of illicit substances by young people or those directed at reducing harm caused by continuing use.* **Design.** *A systematic review was conducted. Reports were identified through electronic and hand searching and contact with known workers in the area. Studies were included if they reported evaluations of interventions targeting illicit drug use and provided sufficient detail of the intervention and design of the evaluation to allow judgements to be made of their methodological soundness. Meta-analyses were conducted combining the data of the methodologically sound studies.* **Participants and settings targeted by interventions.** *Evaluations of interventions were included if their targeted audience included young people aged between 8 and 25 years. Identified evaluations were delivered in a range of settings including: schools and colleges; community settings; the family; medical/therapeutic settings; mass media.* **Measurements.** *Data extracted from each report included details of design, content and theoretical orientation of intervention, setting of the intervention, target audience, methods, population size, subject refusal rates, rates of attrition, outcome measures, length of follow-up and findings, including statistical power.* **Findings.** *The majority of studies identified were evaluations of interventions introduced in schools and targeting alcohol, tobacco and marijuana simultaneously. These studies were methodologically stronger than interventions targeting other drugs and implemented outside schools. Meta-analyses showed that the impact of evaluated interventions was small with dissipation of programme gains over time. Interventions targeting hard to reach groups have not been evaluated adequately.* **Conclusions.** *Effort needs to be directed towards the development of improved evaluative solutions to the problems posed by these groups. There is still insufficient evidence to assess the effectiveness of the range of approaches to drugs education; more methodologically sound evaluations are required. There is also a need to target interventions to reflect the specific needs and experiences of recipients.*

Introduction

Surveys of young people in Britain, USA and elsewhere point to relatively high levels of experimenting with illicit drugs, but with large regional and cultural variations.[1] The mean age of first experimentation with illicit substances and solvents varies somewhat with the particular drug used,[2] but surveys reveal that initiation into drug use usually occurs after the age of 12 years and the number who have ever tried drugs then rises rapidly up to the age of 15 years and stabilizes. Although the age range for first initiation into drugs tends to be narrow there is also evidence that early initiation is associated

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with later problem use.[3] Consequently, health promotion interventions to prevent or delay the onset of substance use frequently target young people from the age of 9–15 years and frequently use schools and colleges as the setting for the intervention. They usually target young people's use of tobacco, alcohol and marijuana together within the same health promotion programme. Tobacco, alcohol and marijuana are sometimes referred to collectively as "gateway" drugs since each can be a bridgehead to more problematic drug use.

There are many studies which evaluate the effectiveness of school-based preventive programmes targeting "gateway" drugs. There have been reviews, including meta-analytical reviews, of programme effectiveness. However, previous reviews with a focus upon "gateway" drugs have usually examined the effectiveness of programmes on "drug use", combining alcohol, tobacco and marijuana use together.[4,5] Programme effectiveness is then assessed on general substance use rather than establishing their impact on the use of specific substances. The effectiveness of these programmes on *illicit* substance use has not been adequately reviewed and so a purpose of the present review was to focus specifically on illicit substance use.

Harm minimization approaches to drugs education are commonly adopted when targeting more established drug use. Such interventions often target hard to reach groups and this poses problems both for programme implementation, but also for programme evaluation. Despite the difficulties involved, these programmes are subject increasingly to evaluative scrutiny. A second purpose of this review was to establish how well various interventions have been evaluated and whether there is evidence of programme effectiveness to guide future initiatives.

Evaluations of interventions are not all conducted with equal methodological rigour. For instance, in a recent review of sexual health interventions[6] Oakley and co-workers judged that only 18% of outcome evaluations were methodologically sound. The defining features of sound studies were that participants were randomly allocated to intervention or non-intervention groups (or study group equivalence demonstrated), they considered the relevance of loss of data caused by participants dropping out of the study (attrition), provided pre-intervention and post-intervention data, and reported on all targeted outcomes. In considering the messages to be drawn from evaluations of illicit drug use interventions, evidence from methodologically sound studies will be accorded particular weight and data from the methodologically sound studies will be subjected to meta-analysis.

Methodology

Identifying studies for inclusion in the review

Literature searches were conducted to identify evaluations of interventions aiming to reduce drug use or drug-related harm conducted since 1980. The following electronic databases were explored to identify both the published and grey (unpublished) literatures: *Medline, Psychlit, Current Contents, ISDD Database, Eric, SciSearch, Social SciSearch, Health Periodicals Database, HEA Unicorn Database, Dissertation Abstracts, Aidsline* and *EMBASE*. These searches were supplemented by hand searches of key journals. Searches for further work of identified authors were conducted to access additional relevant material and the citations of identified reports were also examined. Additional attempts were made to locate the grey literature by contacting contributors to the 4th and 5th International Conferences on the Reduction of Drug Related Harm, to identify ongoing, unpublished work as well as providing a partial check for the thoroughness of the identification of published work. Contacts were made with groups in the UK and the Netherlands. Initial searches were concluded in August, 1995. These have been supplemented by further searches of *Psychlit, ISDD Database* and *Current Contents* through to April 1997.

From a reading of the titles (and abstracts when available), reports were selected as relating to interventions for the reduction of drug use or drug-related harm and hard copies were obtained. Each report was considered against inclusion and exclusion criteria to ensure that they satisfied criteria of relevance, outcome and design.

- Studies were included that reported evaluations of psycho-educational prevention measures designed to prevent or delay onset of drug use, or leading to cessation of use, or minimize the harm associated with substance use.

- Included studies described interventions targeted at young people aged 8–25 years.
- Generic drug education interventions directed towards reduction in the use of "gateway" drugs were included when outcome measures for marijuana and other illicit substances were reported separately allowing an evaluation of intervention effectiveness related to marijuana use or the use of other identified illicit substances.
- Studies were only included if they adopted a design that included: control group(s) or comparison of groups experiencing different intervention strategies; both baseline and outcome measures.
- Studies written in any language were included.

Therapeutic interventions involving individual or small group therapy or counselling were outside the remit of the present review.

Each report identified was reviewed and categorized against a standard data extraction sheet according to design, theoretical orientation of intervention, setting of the intervention (e.g. school, community centre), target audience, methods, population size, subject refusal rates, rates of attrition, content of intervention, outcome measures, length of follow-up, findings, including statistical power, the study author's view of effectiveness, the present authors'/reviewer's judgement of effectiveness and their decision whether the inclusion criteria had been met. Each of the reports selected for inclusion in the final review was read by two or more reviewers, including both of the authors of this review. Where disagreements arose, reviewers discussed their categorisations, use of definitions and came to a final agreement. (The on-line search strategy and the standard data extraction forms are available from the authors.)

Methodological rigour of studies

The reports to be included in the final review were categorized according to their methodological sophistication. Following the example of Oakley, studies were judged to be methodologically sound only if they reported on the targeted outcome of the intervention (in this case an outcome relating to drug using behaviours), reported subject refusal and attrition rates and discussed their possible impact on the findings, and included comparisons of baseline data for different study conditions and corrected for any baseline differences identified. In addition, they assessed whether programme effectiveness persisted beyond the end of the programme.

Meta-analyses of methodologically sound studies

Computation of effect sizes. Dependent upon the information provided within each study the effect size(s) were calculated using the following data (in order of preference): means, standard deviations or frequencies, and sample sizes for all groups; test of significance value (e.g. F ratio); and significance level and sample size.

The product–moment correlation coefficient r was utilised as the primary effect size estimate. These were transformed to Fisher Z-scores before any combination of study effect sizes occurred. The studies varied enormously in their sample sizes and so in combining effect size estimates greater weight was given to larger studies:[7] studies were weighted by their sample size (N–3). In combining effect sizes a positive sign was given to studies where drugs education was associated with less drug use and a negative sign where drugs education was associated with increased drug use.

Testing for heterogeneity. Once a combined effect size had been calculated, the effect sizes were tested for heterogeneity; a χ^2 was conducted using the weighted mean effect size as the expected value. A very significant χ^2 shows that the effect sizes vary substantially and suggests that an attempt should be made to find moderator variables accounting for the variability.

Significance testing. In order to acquire an overall estimate of the probability that the set of p values might have been obtained if the null hypothesis of no relationship between drug use and exposure to drugs education were true, p levels were combined giving greater weight to larger studies (N–3). The standard normal deviate, Z, corresponding to each p value (one-tailed) was weighted by sample size and summed to provide a combined Z for each set of studies. In combining probability levels a positive sign was given to studies where drugs education was associated with less drug use and a negative sign where drugs education was associated with increased drug use. The probability value for

each combined Z score was obtained from standard Z-tables.

Incomplete reporting of findings. In the case of incomplete data where no usable data were presented but non-significant findings were reported, the study was still used in the meta-analysis and an effect size estimate of 0.0 and a one-tailed p value of 0.50 was assigned. When an F ratio was reported as < 1 a value of 0.50 was assigned.

File drawer analysis. Searches for studies to be included in a meta-analysis are unlikely to identify all of the studies actually conducted. The formula provided by Rosenthal,[7] $(N = [(\Sigma Z)^2/2.706] - K$ where ΣZ is the sum of the standard normal deviates associated with the one-tailed ps of all the k studies retrieved) was used to compute a Fail-safe N for each meta-analysis that resulted in a significant effect. This was the preferred method for dealing with a potential "file drawer" problem of an unknown number of studies with effect sizes of zero that remain unpublished somewhere in file drawers. The Fail-safe N calculates the number of file drawer studies which would be required for the obtained probability level to be made non-significant. If the Fail-safe N is less than five times the number of studies included plus 10, then a file drawer problem may exist.

Results

In total, 4876 studies were located; 1486 of these were selected as potentially relating directly or indirectly to interventions for the reduction of drug use or drug-related harm. The 1486 selected reports were screened and those not relating to interventions (frequently reports of treatments) or descriptions of interventions without any evaluative component were eliminated, leaving 140 reports examining 125 separate evaluations of programme effectiveness. Full data were extracted from these reports and inspected against the inclusion criteria to select those which were methodologically adequate. Seventy-one studies examining 62 separate evaluations of programmes met the inclusion criteria. The most common reasons for excluding studies were: programme targeted alcohol, smoking and illicit drugs together but provided no details of its impact on separate substances; inadequate details of the nature of the interventions; no comparison data; participants outside of the age restrictions for the review (the age of participants targeted in this review resulted in the exclusion of most of the identified interventions directed at the reduction of drug related harm among injecting drug users). Data were extracted from studies written in a number of languages. However, all the studies meeting the inclusion criteria were written in English.

Overall, 50% of the evaluations of programmes were of sufficient methodological merit to be included in the review, although many of these had some weaknesses. A subset of these totalling 20 evaluations were methodologically "sound" and are considered separately. School-based programmes have been the most commonly evaluated (87 were located) and a high proportion of these (63%) met the inclusion criteria. However, no harm minimization programmes (13 considered), community-based programmes (7 considered) or mass media campaigns (6 considered) met the criteria. Although no community-based programme was included, several of the included programmes had a community component. Eight evaluations of programmes implemented in therapeutic or medical settings (e.g. antenatal clinics) were located and six were included. Four evaluations of family-based programmes were considered and one was included.

With one exception all included evaluations reported their sample size and 71% included measures of drug-using behaviour.

School-based interventions

The majority of the included evaluations reported on programmes directed towards adolescents and introduced in schools or colleges (89% of the included evaluations). Evaluations of these programmes varied in their methodological features. The drugs targeted in the programmes varied slightly: 47% targeted marijuana only, 25% targeted marijuana and cocaine and 24% targeted "drugs" without specifying which drugs. A significant minority did not assess the impact of the programme on drug use, but only on knowledge, attitudes and intentions. Those studies assessing the impact on behaviour all relied on self-reported use with no biochemical verification, although a few introduced bogus saliva or breath tests to encourage honest report-

ing. In all cases self-reported marijuana use was the outcome measure, although one evaluation also measured use of other drugs. Of those that considered the effect of programme participation on behaviour, some assessed outcome immediately at the end of the programme while others looked for longer-term continuing programme effects. In general the collection of longer-term follow-up data were associated with studies having more sophisticated designs, with a greater likelihood of random allocation of participants to conditions, reporting and analysing of both baseline differences and effects of attrition.

Earlier reviews[8] have demonstrated that it is easier to modify attitudes, normative beliefs and knowledge than behaviour, and this was confirmed by the present review. Sixty-four per cent of evaluated interventions successfully modified attitudes, etc. but only 27% modified behaviour; 15 of the 55 included evaluations reported statistically significant programme gains of reduced drug use.[9–23] Thus, 73% of the included evaluations failed to show any impact on participants' behaviour. Not all the 15 effective programmes were evaluated by methodologically rigorous studies. Indeed, only 18 of the 55 evaluations (33%) met the criteria for methodologically "sound" studies.[9–11, 13–15,17,18,20,22,24–31] Ten of the "sound" evaluations (56%) showed some impact on drug using behaviour.[9–11,13–15,17,18,20,22]

To explore further these methodologically sound studies, two meta-analyses were conducted, one considering interventions whose evaluations had extended up to 1 year beyond the delivery of the programme and another analysis of longer-term evaluations of 2 years or more. Eleven studies were included with the shorter follow-up: two of them reported separately on programme effectiveness for different groups and so the meta-analysis combined 14 sets of data. Ten studies were included with longer follow-up periods: one reported separately on two groups of participants and this meta-analysis combined 11 sets of data. Three programmes were evaluated at several time points and featured in both meta-analyses. A summary of the studies, showing the duration of their follow-up, their sample size and other statistics are shown in Tables 1 and 2.

Both meta-analyses showed that the effects of interventions on illicit substance use were small and that effects declined somewhat with time, with weighted mean effect sizes of 0.037 and 0.018, respectively, for the shorter and longer duration. In both cases the test for homogeneity showed that the effect sizes combined were not significantly heterogeneous and no studies were excluded from the final meta-analyses ($\chi^2 = 9.96$, $df = 13$, $p = 0.70$ and $\chi^2 = -1.28$, $df = 10$, $p = 0.99$, respectively). The combined significance levels for the sets of studies were $Z = 3.638$, $p < 0.002$ for the shorter duration studies and $Z = 2.134$, $p = 0.016$ for the studies of longer duration; exposure to drugs education was associated with lower drug use. Both meta-analyses yielded robust results, with a Fail safe N very much larger than the appropriate critical value: Fail safe $N = 944$ for meta-analysis of studies with 1 year follow-up, critical value = 80; Fail safe $N = 192$ for meta-analysis of studies with 2 or more years follow-up, critical value = 65. In neither case was there likely to be a "file drawer" problem.

The studies were fairly consistent in showing that modern drugs education messages are rarely counter-productive. Of 11 evaluations carried out to 1 year, 10 showed that the direction of effect favoured drugs education. Their impact may be small but they were associated with a decrease in substance use; evaluations beyond 1 year also pointed to the benefits of health interventions with eight of the 10 interventions showing small, but positive effects and two showing marginal and insignificant counter effects. Any closer examination of changes across time inevitably involves very small numbers of studies and so needs to be treated with caution. Of the included studies examining impact of drugs education beyond 1 year, four have looked at their effectiveness after 2 years, four after 3 years and two after 6 years. The effect sizes of these (small) groups of studies were 0.026 for studies at 2 years, 0.037 for 3-year evaluations and 0.016 for 6-year studies.

Over half of the evaluations of longer-term programme effectiveness showed some statistically significant impact on drug-using behaviour extending beyond the end of the programme. What features did these effective programmes share? Most commonly both the effective and ineffective interventions incorporated a number of elements which aimed to increase knowledge of the effects of different substances and of the potential harm associated with them, to change beliefs about the prevalence of drug use, to pro-

Table 1. *Sound studies evaluating programmes with follow-up to 1 year*

Study	Follow-up period (months)	Direction of effect	Sample size	*Z* scores	Effect size (*r*)	Number sessions	Booster sessions	Evidence effective
Botvin *et al.*, 1990*	12	+	998	1.107	0.035	20	✓	✓
Cook *et al.*, 1984	12	+	134	0.104	0.009	30	×	×
Ellickson & Bell, 1990*†	12	+	1976	1.911	0.043	8	✓	✓
		+	1344	1.502	0.041			
		+	554	0.588	0.025			
Hansen & Graham, 1991	12	+	2416	2.141	0.044	10	×	✓
Harmon, 1993	5	+	602	0	0	17	×	×
Kim *et al.*, 1993	8	+	228	1.952	0.129	28	×	×
Malvin *et al.*, 1985	12	+	20	0.703	0.157	12	×	×
Moskowitz *et al.*, 1983†	12	+	286	0.707	0.042	12	×	×
		+	186	0.706	0.052			
Pentz *et al.*, 1990	12	+	5008	1.645	0.023	10 +	×	✓
Schinke *et al.*, 1988	6	+	137	1.645	0.141	10 +	×	✓
Shope *et al.*, 1996	< 12	+	442	2.218	0.108	30	✓	✓
Overall			14331	3.638	0.037			

*Both the studies of Botvin *et al.* and Ellickson & Bell compare the impact of different intervention programmes. For this analysis the results of the different intervention strategies are combined. In both studies interventions delivered by older peers are more effective than the same programme delivered by teachers or health educators. The effect sizes are slightly larger for those selected groups.

†Both Ellickson & Bell and Moskowitz *et al.* report separately on programme effectiveness for different groups. Ellickson & Bell report on those who at baseline were: non-users of either cigarettes or marijuana; smokers of cigarettes but not marijuana; and marijuana users. Moskowitz *et al.* report separately for males and females.

Table 2. *Sound studies evaluating programmes with follow-up 2 or more years*

Study	Follow-up period (years)	Direction of effect	Sample size	*Z* scores	Effect size (*r*)	Number sessions	Booster sessions	Evidence effective
Botvin *et al.*, 1995a	6	+	2752	2.19	0.021	15	✓	✓
Botvin *et al.*, 1995b	2	+	456	0	0	15	✓	×
Cook *et al.*, 1984	2	+	108	0	0	30	×	×
Ellickson *et al.*, 1993	6	−	4000	0.253	0.004	8	×	×
Horan & Williams, 1982	3	+	72	0.546	0.064	5	×	✓
Johnson *et al.*, 1990	3	+	1105	1.729	0.052	10 +	×	✓
Malvin *et al.*, 1984*	3	−	132	1.852	0.161	—	—	×
		−	137	0.706	0.060	—	—	×
Pentz *et al.*, 1989	2	+	1264	1.645	0.046	10 +	×	✓
Snow *et al.*, 1992	2	+	1075	0.524	0.016	—	—	×
Stevens *et al.*, 1996	3	+	1200	1.900	0.055	28 +	×	✓
Overall			12301	2.134	0.018			

*Malvin *et al.* report separately the programme effectiveness for males and females.

vide the skills to resist the pressures to use drugs, to provide peer support and modelling, enhancement of self-esteem and provision of alternative strategies for gaining peer approval and personal reinforcement and improved attitudes to abstinence. However, some programmes were more specific in their targeting and focused on one core skill, e.g. assertiveness or refusal skills or normative education. The effective interventions were a mix of focused and generic training. Both broadly based and more specifically focused interventions can have an effect. The methodologically sound, effective programmes were: two separate evaluations of Botvin's generic life-skills training programme[9,10] which demonstrated some continuing success 5 years after the end of the programme; two separate evaluations of the generic Midwestern Prevention Program with 2- and 3-year follow-ups;[15,17] generic Here's Looking at You 2000 when supported by community action[22] with a 3-year follow-up; an assertiveness training programme[14] reporting programme gains after 3–5 years. Programmes which have had some success over a shorter evaluation period were: generic Project ALERT[11] effective for up to a year, with later evaluations showing early gains dissipated rapidly,[32] refusals skills training,[18,20] one training culturally sensitive skills, effective when supplemented with home-based activities; and a normative education programme.[13] The methodologically weaker, but effective programmes were also a mix of generic[21] and specifically focused[12,16,19,23] interventions. One reported programme success after 3 years[21] and another after 4 years.[23]

Tables 1 and 2 indicate the amount of curriculum time devoted to each programme and whether or not the programme introduced booster sessions to reinforce the programme messages. Of the 10 effective, soundly evaluated programmes, eight included booster sessions,[9–11,15,17,18,20,22] or had additional elements that served a similar purpose (e. g. a community or mass media component). Furthermore, examination of the additional five programmes that were effective although evaluated with less methodological rigour also point to the importance of booster sessions; four of the five incorporated this component.[16,19,21,23] Only one study incorporating booster sessions[24] proved ineffective in targeting illicit drug use and that study used as a control a group who received an information-only intervention. Including elements in a programme to regularly reinforce messages seems worthwhile. A further feature of the majority of the effective programmes was that the programme was intense with a large amount of curriculum time devoted to the programme. Eight of the effective, soundly evaluated programmes had 10 or more sessions devoted to the delivery of the programme.[9,10,13,15,17,18,20,22] Examination of the less well evaluated programmes also pointed to the value of this feature. All five were intense programmes.[12,16,19,21,23] Intensity of programmes does not, however, guarantee effectiveness since six of the soundly evaluated programmes were intense but ineffective.[24–27,29,30] One intensive programme that has been evaluated extensively is Project DARE (a programme delivered by uniformed police). This has been found ineffective even in the short term.[5,26] Intense interventions supported by booster sessions can be effective, but the programme gains are small.

Normally, evaluations did not consider the impact of individual programme components but instead evaluated whether the programme as a whole had any impact. However, one intervention with a community component has considered the programme effectiveness when community interventions were included compared to the programme when this element was omitted.[22] This evaluation demonstrated the effectiveness of a school-based programme tackling marijuana smoking, but only when it was supported by the inclusion of community interventions. One other programme with longer-term effectiveness also included community-based interventions,[15,17] reinforcing the view that community-wide intervention components can reinforce the messages of school-based activities. Indeed, it has been claimed that interventions targeting cigarette smoking have lasting programme effects only when school-based interventions are linked to community-wide activities.[33]

Unfortunately, there were too few studies conducted beyond the USA (10%) to determine whether programmes introduced in different countries had different levels of success. Only two of the included studies were British, one was Israeli and three were Australian. Furthermore, the particular intervention strategies adopted in Australia and Britain were generally less intense than the typical programme from the USA, involving less curriculum time, further hindering

comparisons. The different social and legal environments in different countries may limit the generalizability of programme success to other settings, countries and age groups.

Botvin[10] and Pentz[34] have both demonstrated that frequently their programmes were not delivered as planned. In both cases programme effectiveness was reduced when the planned programme was modified by the programme deliverers. The evaluation to show the longest-term programme impact was Botvin's life-skills training programme when delivered with fidelity.[10]

Targeted interventions

Only seven programmes designed for delivery in non-school settings met the inclusion criteria for this review. Three of these used urine tests to validate the level of self-reported drug use.[35–37] Two of these showed evidence of effectiveness,[35,36] as did one study relying entirely on self-report.[38] There is a growing recognition that the effectiveness of interventions needs to be evaluated separately upon different populations, with interventions tailored differently for different target audiences and each of the effective non-school-based programmes was designed to meet the needs of a specific target audience. A relapse prevention intervention directed at problem drug users' use of marijuana, cocaine, amphetamines and opiates showed initial benefits,[36] but these dissipated over the course of a year. It is unclear whether relapse prevention is superior to other strategies.[37,39] An intervention aimed at young, black, pregnant women[35] claimed a high degree of effectiveness in reducing marijuana use and is of interest as the only self-paced programme encountered; women worked through packages including activity-based work at their own rate. An intervention directed towards pregnant injecting drug users was effective in reducing self-reported sharing of injecting equipment at 9-month follow-up but had no impact on opiate use, use of other drugs or on frequency of injecting.[38] Although outside the scope of this review, other interventions also targeting injecting behaviours seemed to be effective in modifying the behaviour of older users.[40,41]

A few schools and college-based "gateway" drug programmes were designed specifically to meet the needs of a selected target group. One programme designed to be culturally relevant for American Indians[18] showed promise. However, other programmes designed for African-American and Hispanic young people had less encouraging findings.[24,42–45] Some evaluations asked whether there were identifiable groups who benefited more or less than others from the programme under consideration. Several considered that programmes might be differentially effective for males and females.[9,12,16,30,46–48] From these it appeared that programmes were more successfully targeted at girls. However, the programme benefits applied only to knowledge, attitudes and skills rather than to drug use.

Only one evaluation outlined here, Project ALERT, separately examined the effectiveness of the intervention in influencing the subsequent behaviour of young people who were non-users at the time of the programme and those who had already experimented with drugs.[49] In the short term non-users showed more programme gains than users. Another study[15] examined the effectiveness of the intervention for young people at different levels of risk, where risk factors included: prior use of cigarettes, prior use of alcohol and a parent who smoked cigarettes. The programme was equally effective for both groups. There is weak evidence that DARE has greater impact on sensation-seekers.[50]

Evaluated interventions not meeting inclusion criteria

The excluded programmes were more varied than the included studies; they included more programmes from counties other than the USA. They also included more interventions directed at substances other than marijuana and were implemented in more diverse settings. Nine of the 63 excluded studies were unpublished or were published as internal reports. A disproportionate number of British studies were excluded, 22 of 24 studies where data were extracted. In contrast, the inclusion rate was over 60% for studies from the USA. The 24 British studies represented a very small proportion of British intervention attempts. However, the majority of British programmes received only a process evaluation; their outcomes were not evaluated. While process evaluations are important it is also essential to know whether interventions are effective in achieving their intended outcomes. The difference between the countries reflects in

part the focus in Britain on targeting hard-to-reach groups who cannot be tracked readily over a number of years. Thirteen of the 24 extracted British studies were attempts to evaluate harm minimization efforts directed at hard-to-contact groups of young people not in contact with drug services, but whose drug use may have been problematic. Because their drug-using is illegal they are hard to identify and recruit to studies. Researchers have so far not solved the evaluation problems in an adequate fashion and instead have collected data, usually only post-intervention, from opportunistic samples, without comparison data. Even interventions where there was baseline data, such as those directed at encouraging drug users to contact drugs services had no comparison data allowing them to associate changes confidently in the patterns of self-referral to their programme.[51] These methodological weaknesses limit the conclusions that can be drawn and some of these approaches need to be assessed more rigorously to determine whether their apparent promise is confirmed, but this means that alternative strategies for evaluation are needed.

Discussion

Sixty-two evaluations were included in this review, 18 produced evidence of programme effectiveness on drug using behaviour, but in only two cases was hard evidence produced to demonstrate an impact on drug use. In the other 16 evaluations evidence of effectiveness was based on self-report alone, although in six of these cases bogus saliva or breath tests were introduced to encourage accurate reporting. The over-reliance on self-reports is a methodological weakness in this area.

Compared to school-based interventions, the seven non-school interventions included in this review had a shorter duration of intervention and lacked long-term follow-up and so were methodologically weaker than school interventions. There are some promising approaches including the training of relapse prevention skills to dependent users, the targeting of safer injecting practices and an intervention directed towards pregnant women. Even programmes that have been evaluated well await replication of findings. More evidence is required before it will be possible to comment on their value.

Interventions directed at school-aged children in the USA, targeting primarily marijuana use, have been evaluated more thoroughly than other interventions. However, even here there are insufficient data to allow clear conclusions to be drawn. The meta-analyses of the methodologically sound evaluations of programmes pointed to the small effect size of the gains attributable to those programmes, but also to the consistency of the direction of findings. The large majority of these programmes, whether or not they achieved statistically significant changes, had the same direction of effect favouring the educational programme. What conclusions follow from this? An effect size of 0.037 (the combined effect size of studies with follow-up to 1 year) is certainly small. One way of expressing an effect of this size is that exposure to school based drugs education accounts for 0.14% of the variance in drug use. That statistic suggests that drugs education has such a trivial impact on behaviour that in its present form it is of no practical relevance. However, in recent trials of pharmaceutical drugs, trials have been terminated on the grounds that the evidence was compelling with effect sizes smaller than those reported here. For instance, the investigation into the impact of aspirin in reducing heart attacks was terminated on the grounds that it would be unethical to continue to give half the subjects a placebo when an effect size of 0.034 was reached.[7] Another way of expressing the meaning of this effect size is that 3.7% of young people who would use drugs delay their onset of use or are persuaded to never use. It is for policy makers to decide whether it is worth seeking to achieve changes among populations of this size.

The available evidence suggests that the best that can be achieved using currently evaluated school-based intervention strategies is a short-term delay in the onset of substance use by non-users and a short-term reduction in the amount of use by some current users. Long-term follow-ups of intervention programmes are required which track individuals from the age of 11 through to, and including, early adulthood to determine whether a small delay in age of onset of substance use translates into either a further delay in regular use of substances, or the non-progression to regular substance use. Without information on the longer-term patterns of use of cohorts of individuals who have or have not experienced these interventions it is impossible to determine what proportion of individuals, if

any, may benefit in the longer term from these programmes. Further evaluations are required.

It may be that the observed effect sizes underestimate the gains that can be made from programmes. Most evaluations of programmes did not check that the programme had been delivered with fidelity. Further, the impact of programmes were typically evaluated on participants who had received 60% or more of the intended curriculum. Many of these participants would have missed critical features of the programme. It is possible that participants who received all of a programme, delivered as intended, would show greater programme gains. There is a need for the development of programmes that are individually paced to ensure that all participants receive the programme in full.

Although overall the studies point to programmes having little effect, there are some individual approaches that are more promising and have slightly larger effects. The large majority of interventions with longer-term impact were intense interventions with the ability to reinforce their messages and programme gains. Furthermore, they usually included booster sessions, increasing both intensity and recency of the programme. In the programmes where boosters were included there is a confounding of recency of intervention, the intensity of the programme and the phasing of the programme. Further research is required to determine the possible effects of booster sessions.

The majority of interventions combined a number of different elements but rarely scrutinized the effectiveness of component elements; instead the total programme was compared with a no-treatment control group. Recent attempts to identify the critical elements in programmes focus on assumed mediating constructs and examines how they relate to changes in drug use.[33] These studies examine how possible mediators such as refusal skills or social norms are linked to drug use. Those elements that do relate to drug use are the elements to target in interventions. Furthermore, preventive programme development can be accelerated by examining the short-term impact of programme elements on drug-relevant mediating constructs.

Too few interventions were designed to target the specific needs of young people at differing stages in their drug-using careers and drawn from differing social and cultural backgrounds. Interventions rarely consider the varying contexts in which drug use (and drug use resistance) occur and allow this information to inform the design of the programme. There are many studies of drug use among young people of school age and there are also many interventions directed at this age group. For those whose drug use is seen by themselves or others as problematic and who are attending drug services, there is also information about their life-styles and the way in which they manage and finance their drug use, about their attitudes to drug use and so on. This group of drug users are typically in their mid-20s or older. This evidence provides information about those who as youngsters engage in experimental drug use and it also provides information about a subset of continuing users whose drug use has become more problematic. What is less clear are the characteristics of continuing users who are not in contact with drug services, and the characteristics and motivations of recreational drug users and how they are different from those who have experimented with drugs and ceased their use and those who have never experimented at all. These different developments in the drug-using lives of individuals usually occur while they are still young. The years immediately following the end of schooling seem critical in tracking the development of drug use and in identifying factors associated with vulnerability and resilience. Without this basic information it is hard to design interventions for this critical period with the maximum chance of effectiveness. Interventions need to be tailored to individuals' stage of habit acquisition and to the particular drugs that they are exposed to or to which they may become exposed. In formulating strategies for targeted interventions it is necessary to contextualise any preventive effort to focus upon where, when and why drugs are being used and what meaning drug use has for users at different stages of their drug-using histories.

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