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Psychosocial interventions for reducing injection and sexual risk behaviour for preventing HIV in drug users (Review)

Meader N, Li R, Des Jarlais DC, Pilling S

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[Intervention Review]

Psychosocial interventions for reducing injection and sexual risk behaviour for preventing HIV in drug users

Nicholas Meader[1], Ryan Li[1], Don C. Des Jarlais[2], Stephen Pilling[3]

[1]National Collaborating Centre for Mental Health, Royal College of Psychiatrists Research and Training Unit, London, UK. [2]Chemical Dependency Institute, Beth Israel Medical Center, New York City, USA. [3]Centre for Outcomes Research and Effectiveness, National Collaborating Centre for Mental Health, London, UK

Contact address: Nicholas Meader, National Collaborating Centre for Mental Health, Royal College of Psychiatrists Research and Training Unit, University College, London, Standon House, 4th Floor, 21 Mansell Street, London, E1 8AA, UK. nmeader@cru.rcpsych.ac.uk.

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ABSTRACT

Background

Drug users (including both injection drug users and crack cocaine users), are at high levels of risk for contracting HIV. Therefore it is important to reduce the injection and/or sexual risk behaviours of these groups both for the benefit of themselves and for society as a whole.

Objectives

To assess the efficacy of multi-session psychosocial interventions in comparison with standard education and minimal intervention controls for the reduction of injection and sexual risk behaviour.

Search methods

Electronic searches were conducted of a number of bibliographic databases (including Cochrane Library, CINAHL, MEDLINE, PsycINFO). In addition, other methods of locating papers were employed including contacting various authors working in the field of HIV risk reduction and examining reference lists of applicable papers identified in the electronic search.

Selection criteria

The inclusion criteria consisted of randomised and quazi-randomised trials assessing the efficacy of psychosocial interventions in the reduction of injection and sexual risk behaviour for people who misused opiates, cocaine, or a combination of these drugs.

Data collection and analysis

Two authors independently assessed the eligibility of studies identified by the search strategy, quality assessed these studies and extracted the data. A total of 35 trials met the eligibility criteria of the review providing data on 11,867 participants.

Main results

There were minimal differences identified between multi-session psychosocial interventions and standard educational interventions for both injection and sexual risk behaviour. Although it should be noted there were large pre-post changes for both groups suggesting both were effective in reducing risk behaviours. In addition, there was some evidence of benefit for multi-session psychosocial interventions

when compared with minimal controls. Subgroup analyses suggest that people in formal treatment are likely to respond to multi-session psychosocial interventions. It also appears single-gender groups may be associated with greater benefit.

Authors' conclusions

There is limited support for the widespread use of formal multi-session psychosocial interventions for reducing injection and sexual risk behaviour. Brief standard education interventions appear to be a more cost-effective option. Further research is required to assess if there are particular groups of drug users more likely to respond to such interventions.

PLAIN LANGUAGE SUMMARY

Psychosocial interventions for the reduction of injection and sexual risk behaviour for preventing HIV in drug users

People who misuse drugs are at greater risk of developing HIV. Interventions designed to reduce this risk have been developed. There were 35 trials on 11,867 participants that examined whether these interventions are effective in reducing sexual and injection behaviour associated with greater risk of developing HIV. There are not large differences in effectiveness between multi-session psychosocial interventions and briefer interventions. This suggests brief educational interventions are more likely to be cost-effective and may be more readily implemented in a variety of different contexts.

BACKGROUND

It is widely accepted that injecting drug users are at greater risk of developing blood borne viruses (such as HIV) than the general population. A recent prospective cohort study of new injecting drug users in the UK found high levels of injecting risk behaviour (Judd 2005). A total of 24% reported having injected in the last 4 weeks with needles and syringes used by someone else and 53% having shared injecting paraphernalia. The baseline prevalence of antibodies to hepatitis C virus was 44% and of antibodies to HIV 4%. It would appear that injecting drug users have an incidence of HIV comparable to that among men who have sex with men attending clinics for sexually transmitted infections (Judd 2005). However, IDUs present as a risk of contracting HIV not only in terms of their injecting but also their sexual risk behaviour. The diverse nature of such risk behaviour presents a formidable challenge for interventions designed to prevent or reduce risk for infection in this population (Copenhaver 2006). In addition, HIV risk behaviours are not only prevalent among IDUs but also in other groups of drug users. For example, people who misuse crack cocaine also appear to engage in high levels of sexual risk behaviour (for example, Malow 1994).

Reducing injecting and sexual risk behaviours of illicit drug users has important public health implications throughout the world. During most of the twentieth century, illicit narcotic use was sufficiently concentrated in the United States that heroin addiction was known as "the American Disease" (Musto 1993). Heroin use then expanded greatly and became well established in Western Europe (EMCCDA2007). With the globalisation of international trade, however, heroin use and illicit drug injection has become a significant problem in developing and transitional countries.

Recent estimates suggests there are approximately 13-16 million injecting drug users worldwide (Aceijas 2004; Mathers 2008). Approximately 77% of the total injecting drug users were located in developing and transitional countries (Aceijas 2004). One important consequence of this is the need for interventions that not only are effective in reducing risk behavior and HIV transmission among IDUs, but that require only modest amounts of resources in terms of both monies and highly trained personnel.

One of the central public health interventions to reduce injection drug use has been through the establishment of needle and syringe exchange programmes. A number of studies have assessed the efficacy of needle and syringe exchange (NSE) programmes. The results have been summarised in several recent systematic reviews (for example, Gibson 2001; Ksobiech 2003;Wodak 2005) and therefore will not be specifically considered here.

The focus of this review will be on multi-session psychosocial interventions designed to reduce injection and sexual behaviours associated with greater risk of contracting HIV.This is important for a number of reasons: firstly this will help to inform NSE and drug treatment programmes on whether the provision of psychosocial interventions (and at what intensity) is likely to prevent HIV risk behaviours which should have important implications for resource use in these settings. Secondly, while the focus of NSE programmes is on reducing injection risk behaviour, for non-injecting drug users and injection drug users who engage in sexual risk behaviour, psychosocial interventions are particularly likely to have potential for reducing HIV risk behaviours in these groups.

There have been few systematic reviews of HIV risk reduction in drug users. A recent systematic review concluded that multi-session psychosocial interventions were effective in reducing risk behaviour (Copenhaver 2006). However, there were some questions with how the meta-analysis was conducted. For example, it appeared that in trials with more than one treatment arm data was included in the analysis of both treatments which is likely to introduce bias in the analysis. In addition, interventions were compared with control groups of varying intensity therefore it is difficult to interpret the effect estimates.

OBJECTIVES

1) To locate and describe randomised and quazi-randomised controlled trials on multi-session psychosocial interventions in comparison with standard education and minimal interventions to reduce injection and sexual behaviours in people who misuse cocaine, opiates, or a combination of cocaine and opiates associated with greater risk of HIV infection.

2) To conduct meta-analysis, where possible and appropriate, to assess the efficacy of the included interventions for reducing injection and sexual risk behaviours.

3) To make practical recommendations on the use of multi-session psychosocial interventions in drug treatment and other services to reduce risk behaviours.

4) To provide suggestions for further research.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised and quasi-randomised controlled trials.

Types of participants

People who misuse opiates, cocaine or a combination of opiates and cocaine. This includes both people in contact with drug treatment services and those who are not. People who primarily misuse alcohol or other drugs such as methamphetamine were excluded from this review.

Types of interventions

Multi-session psychosocial interventions designed specifically to reduce injection and/or sexual risk behaviour among people who misuse drugs. Multi-session psychosocial interventions were defined as a programme designed for individuals or groups of people who misuse drugs that consist of a minimum of three sessions combining education about HIV with skills training to improve communication skills, assertiveness, and safe sexual and injection risk behaviour. It also provides people who misuse drugs with an opportunity to ask questions and receive relevant feedback. These interventions are provided in a variety of settings such as methadone maintenance clinics, needle and syringe exchanges, and outreach programmes.

Standard education interventions designed for individuals or groups of people who misuse drugs and consisting of one to two sessions. The content is often similar to multi-session interventions including HIV testing, counselling and some skills training.

Minimal intervention was defined as receiving minimal or no psychosocial intervention and often involved the provision of a self help booklet.

Types of outcome measures

Intervention studies should contain at least one outcome measure of injection risk behaviour, sexual risk behaviour, or HIV seroconversion.

Search methods for identification of studies

a) Electronic searching

We searched the Cochrane Library, CINAHL, MEDLINE, and PsycINFO databases in November 2006, using the following search strategy, from inception to 2006:

Drugs filter
1) Cocaine-related disorders/or Substance withdrawal syndrome/ or exp Opioid-related disorders/ or Substance abuse, intravenous/ or Substance-related disorders/

2) Analgesic agent abuse/ or Cocaine dependence/ or Drug abuse/ or Drug abuse pattern/ or Drug dependence/ or Drug misuse/ or Intravenous drug abuse/ or Multiple drug abuse/ or exp Narcotic dependence/ or Opiate addiction/or Substance abuse/ or "Substance use disorders"/ or Substance abuse/ or Substance abuse, intravenous/ or Substance abuse, perinatal/ or Substance dependence/ or Substance withdrawal syndrome/

3)Drug abuse/ or Drug Dependency/ or Polydrug abuse/ or Drug addiction/ or Drug dependency/ or Heroin addiction/ or Drug overdoses/ 5(((stimulant$ or polydrug$ or drug$1 or substance) adj3 (abstain$ or abstinen$ or abus$ or addict$ or (excessive adj use $) or dependen$ or disorder$ or intoxicat$ or misuse$ or over dos $ or overdos$ or (use$ adj (disorder$ or illicit)) or withdraw$)) or (drug$1 adj user$)).tw.

4) or/1-3

5) (abstain$ or abstinen$ or abus$ or addict$ or (drug adj use$) or (excessive adj use$) or dependen$ or intoxicat$ or misus$ or over dos$ or overdos$ or (use$ adj (disorder$ or illicit)) or withdraw $).ti,ab.

6) Diamorphine/ or exp Heroin/ 9(heroin or diacetylmorphine or diamorphine or morphin$ or morfin$).ab,ti.

7) exp Narcotic agent/ or exp Narcotics/

8) opioid$.ab,ti.

9)opiate$.mp.

10) exp Methadone/

11) methadone.ab,ti.

12)exp Opiate/ or exp Opiates/ or exp Opium/

13)opium.ab,ti.

14) exp Amphetamines/

15) (amphetamine$ or amphetamine$ or crank or methamphetamine$ or dextroamphetamine$ or speed).ti,ab.

16) exp Cocaine/

17) (cocaine or crack).ab,ti.

18)Central nervous system stimulants/ or Central nervous system stimulating drugs/ or
Central Stimulant Agent/

19)(analeptic$ or psychostimulant$ or stimulant$).ab,ti.

20)(diethylpropion or ephedrine or fenfluramine or methylphenidate or pemoline or
phenmetrazine or phendimetrazine or phenylpropanolamine).mp.

21) or/4-20

Psychosocial Interventions filter
22) adaptation,psychological/

23) exp aversive stimulation/ or exp electrical stimulation/

24) exp behavior therapy/

25) "biofeedback (psychology)"/ or "biofeedback (IOWA NIC)"/ or biofeedback/ or
feedback system/

26) exp case management/

27)exp cognitive therapy/

28) exp community mental health/ or exp community mental health services/

29)exp community networks/

30) exp coping behavior/

31) exp counseling/ or exp family counseling/ or exp patient counseling/

32) (day care$ or partial hospitalization).sh.

33) education program/

34) exp family therapy/

35) exp "imagery (psychotherapy)"/

36)interpersonal psychotherapy/

37) exp marriage counseling/ or exp marital therapy/

38) exp motivation/

39)patient education/ or client education/

40) psychoeducation/

41) exp psychodynamics/

42) exp psychotherapy/ or psychotherapy,brief/ or exp brief psychotherapy/ or psychotherapy,group/ or psychotherapy,multiple/ or exp supportive psychotherapy/ or exp

interpersonal psychotherapy/ or exp expressive psychotherapy/ or exp group psychotherapy/ or exp individual psychotherapy/

43) exp reinforcement/ or exp reinforcement schedules/ or exp reinforcement,social/

44) exp relaxation/ or exp relaxation techniques/

45)residen$.mp. and (rehab$.mp. or exp drug abuse/rh or exp substance abuse/rh or exp substance related disorders/rh)

46)exp self help groups/ or exp self help/

47)social adaption/ or exp social adjustment/

48)exp social skills training/

49)exp social support/

50) exp socialization/

60) exp teaching/

61) exp therapeutic community/

62) biofeedback.tw.

63) ((case or care) and management) or CPA or care programme approach or assertive community treatment or PACT or TCL or (training adj2 community living) or (madison adj5 model)).mp.

64) ((behavio?r$ or cogniti$) and (educat$ or intervent$ or manage $ or program$ or rehab$ or technique$ or therap$ or train$ or treat $)) or cbt).tw.

65) (communicat$ adj5 (educat$ or intervent$ or manage$ or program$ or rehab$ or technique$ or therap$ or train$ or treat $)).tw.

66) (confrontational adj5 (educat$ or intervent$ or manage$ or program$ or rehab$ or technique$ or therap$ or train$ or treat $)).tw.

67) (contingency adj5 (educat$ or intervent$ or manage$ or program$ or rehab$ or technique$ or therap$ or train$ or treat $)).tw.

68) ((cope or coping) adj5 (educat$ or interven$ or manage$ or program$ or technique$ or therap$ or train$ or treat$)).tw.

69) (counsel?ing or counsel?or$).mp. or ((clientcentred or client centred) adj5 (communicat$ or educat$ or intervention$ or management$ or treatment$ or program$ or relation$ or support$ or therap$ or train$)).tw.

70) covert sensitisation.tw.

71) (day adj (care$ or center$ or centre$ or facilit$ or hospital$ or program$)) or daycare$).tw.

72) (educat$ adj5 (film$ or intervention$ or lecture$ or program$ or therap$ or treat$)).tw.

73) (family adj (based or cent$ or focused or focused)) or (family adj3 (communicat$ or educat$ or intervention$ or manage$ or treat$ or program$ or relation$ or support$ or therap$ or train$)) or (conjoint adj therap$) or (parent and (child$ adj3 treatment$)) or ((father or mother or parent) and (child adj3 (intervention$ or therap$ or treatment$))) or (family-based or family-responsive or family-relation$)).tw.

74) ((inter personal or interpersonal) adj5 (educat$ or intervent$ or manage$ or program$
or technique$ or therap$ or train$ or treat$)).tw.

75) ((marital or marriage) adj (based or cent$ or focused)) or ((marital or marriage) adj5
(educat$ or intervent$ or manage$ or program$ or rehab$ or technique$ or therap$
or train$ or treat$))).tw.

76) (matrix or minnesota) and model).mp.

77) ((milieu or situational or socio?environmental or socio environmental) adj5 (educat$ or intervent$ or manage$ or program $ or rehab$ or technique$ or therap$ or train$ or treat$)) or (therapeutic adj communit$)).tw.

78) (motivation$ adj5 (educat$ or enhance$ or interview$ or manage$ or program$ or intervention$ or technique$ or therap $ or train$ or treat$)).tw. 80((neurobehavio$ or neuro behav$) adj5 (educat$ or intervent$ or manage$ or program$ or rehab $ or technique$ or therap$ or train$ or treat$)).tw. 81(psycho $ adj (communicat$ or educat$ or intervention$ or manage$ or treatment$ or program$ or rehab$ or relation$ or support$ or technique$ or therap$ or train$)).mp.

80) (psycho analy$ or psychoanaly$).mp.

81) (psycho dynamic$ or psychodynamic$).mp.

82) (psycho educat$ or psychoeducat$).mp.

83) (psychological adj5 (educat$ or intervent$ or manage$ or program$ or rehab$ or technique$ or therap$ or train$ or treat $)).tw. 86(psycho-social$ or psychosocial$).mp.

87) psychotherap$.mp.

88) (reinforcer$ or reinforcement).tw.

89) relapse prevent$.tw.

90) relax$.mp. or controlled breathing.tw.

91) (self control and (educat$ or intervent$ or manage$ or program $ or technique$ or
therap$ or treat$)).tw.

92) ((selfhelp or self help$ or self control) adj (based or cent$ or focused or focused)) or ((selfhelp or self help$ or self control) adj3 (communicat$ or educat$ or intervention$ or management$ or technique$ or treatment$ or program$ or relation$ or support$ or therap$ or train$))).tw.

93) (skill$ adj3 train$).tw.

94) (social adj2 (adapt$ or adjust$)).mp.

95) (social skill$ adj5 (educat$ or intervent$ or manage$ or program $ or technique$ or therap$ or train$ or treat$)).tw.

96) (stress adj5 (educat$ or intervent$ or manage$ or program$ or technique$ or therap$ or train$ or treat$)) or ((anger or parent$) adj3 manage$)).tw.

97) (supportive adj5 expressive).tw.

98) "12 step$1".tw.

99) ((psych$ or social$) adj5 (educat$ or intervent$ or manage$ or program$ or technique$ or therap$ or train$ or treat$)).tw.

100) or/22-99

RCT filter
101) exp clinical trials/ or exp clinical trial/ or exp controlled clinical trials/

102) exp crossover procedure/ or exp cross over studies/ or exp crossover design/

103) exp double blind procedure/ or exp double blind method/ or exp double blind studies/ or exp single blind procedure/ or exp single blind method/ or exp single blind studies/

104) exp random allocation/ or exp randomization/ or exp random assignment/ or exp random sample/ or exp random sampling/

105) exp randomized controlled trials/ or exp randomized controlled trial/

106) (clinical adj2 trial$).tw.

107) (crossover or cross over).tw.

108) ((single$ or doubl$ or trebl$ or tripl$) adj5 (blind$ or mask$ or dummy)) or (singleblind$ or doubleblind$ or trebleblind$)).tw.

109) (placebo$ or random$).mp.

110) (clinical trial$ or random$).pt. or (random$ or clinical control trial).sd.

111) or/101-110

112) and/21,100,111

b) Reference lists
Reference lists of all the studies which went into the pool of retrieved studies, including those of other reviews, were examined in order to identify any further studies.

c) Personal contact
We attempted to contact authors and experts in the field to identify further relevant studies.

Data collection and analysis

1. Selection of studies

NM and RL independently applied the inclusion criteria and differences were resolved by a third author (SP). Studies were reviewed for relevance on the basis of study design, population, intervention, and outcome as set out above.

2. Data extraction

Data was entered into a database designed specifically for data extraction which has been piloted on several previous systematic reviews by the authors providing a standardised overview of all included studies and the reasons for exclusion of excluded studies.

3. Quality assessment

The SIGN checklist for randomised controlled trials (for further details see NICE 2005) was used to assess the quality of all included trials. NM and RL applied the quality criteria independently and any differences were resolved by a third reviewer SP.

4. Data synthesis

Meta-analysis, where possible and appropriate, was conducted.

Sub-group analyses were undertaken on setting, gender-specific interventions, and HIV testing.

RESULTS

Description of studies

A total of 35 trials met the eligibility criteria of the review providing data on 11,867 participants and 24 trials were excluded.

Of the included trials, 28 contained comparisons of multi-session psychosocial interventions with standard education, five comparisons of multi-session psychosocial interventions with the provision of a self-help booklet, six comparisons of standard education with a self-help booklet (the total number of comparisons was greater than the total number of trials as some included more than one treatment or control arm). Multi-session psychosocial interventions ranged from 3-16 sessions, whilst standard education and self-help interventions consisted of one to two sessions. In addition, 4 of these included trials conducted a sub-analysis on participants who were considered to be at a high risk of contracting blood-borne viruses. No unpublished or foreign language studies were identified by the search methods.

In terms of setting in which the multi-session psychosocial intervention was delivered, 12 trials were of people in formal drug treatment and 23 trials were of participants not in formal drug treatment.

Risk of bias in included studies

Most studies did not report methods of allocation concealment, information was available from only two studies (SORENSEN1994: Detox; SORENSEN1994: MMT;TUCKER2004) both used sealed envelopes.

In terms of randomisation, 13 trials were quasi-randomised all forming part of the NADR study (COLON1993; KOTRANSKI1998; SIEGAL1995; NADR: Site 1; NADR: Site 10; NADR: Site 14; NADR: Site 16; NADR: Site 17; NADR: Site 18; NADR: Site 19; NADR: Site 20; NADR: Site 4) all other included studies were randomised.

In terms of blinding, seven trials reported not using blinding, 24 trials blinding was not reported and four studies were single blinded.

Attrition, as commonly found in studies of people who misuse drugs, was high.

Effects of interventions

All results of the meta-analyses are provided in the data and analyses section. Separate meta-analyses compared multi-session psychosocial interventions with standard education, standard education with minimal controls and multi-session psychosocial interventions with minimal controls.

In addition, planned sub-group analyses were conducted comparing the effectiveness of interventions for formal and informal settings, single-gender and mixed gender groups, and in studies that included HIV testing in both groups. These sub-group analyses were examined using combined injection and sexual risk behaviour in order to increase the power of detecting differences between sub-groups.

Multi-session psychosocial interventions versus Standard education (see section 1: Data and analyses)
There was little evidence of benefit for multi-session psychosocial interventions in comparison with standard education. In terms of injection risk behaviour, no differences were found in the dichotomous outcome of engaging in safer injecting behaviours (RR = 1.03, 95% CI 0.95, 1.11) nor for the continuous outcome of reducing risk behaviour at endpoint (SMD = -0.04, 95% CI -0.31, 0.23). For both outcomes there was high heterogeneity with I^2 values of 59% and 69% respectively. However, at longer term follow up there was some evidence of benefit (SMD = -0.81, 95% CI -1.29, -0.33) but data was only available for one trial.

There was similar results with regard to sexual risk behaviour. Little difference was found between multi-session psychosocial interventions and standard education in engaging in safer sexual risk behaviour (RR = 1.05, 95% CI 0.98, 1.13) and reducing sexual risk behaviour (SMD = -0.12, 95% CI -0.33, 0.08). There was also high heterogeneity (I^2 = 49% and 39% respectively).

Combining data on injection and sexual risk behaviour there was some evidence for a small increase in safer behaviour (RR = 1.12, 95% CI 1.04, 1.20), however, there was a high level of heterogeneity (I^2 = 81.1%). Similarly, there was a small, but not statistically significant, reduction in risk behaviour (SMD = -0.17, 95% CI -0.37, 0.03) and evidence of high heterogeneity (I^2 = 62.0%).

Standard education versus Minimal Control (see section 2:Data and analyses)
There was no evidence of difference between standard interventions and minimal interventions for both injection risk behaviour (engaging in risk behaviour: RR = 1.10 95% CI 0.92, 1.31; reducing risk behaviour: SMD = -0.06; 95% CI -0.30, 0.19) and sexual risk behaviour (engaging in risk behaviour: RR = 1.07, 95% CI 0.70, 1.64; reducing risk behaviour: SMD = -0.10, 95% CI -0.34, 0.14).

Multi-session psychosocial interventions versus Minimal Control (see section 3: Data and analyses)
There was no evidence of difference between multi-session psychosocial interventions and minimal interventions for injection risk behaviour (SMD = 0.05, 95% CI -0.33, 0.43). However, there was some evidence of benefit for multi-session psychosocial interventions for sexual risk behaviour in terms of dichotomous measures (although only consisting of one study) of engaging in safer sexual behaviour (RR = 1.34, 95% CI 1.03, 1.73) and in terms of continuous measures of reducing sexual risk behaviour (SMD = -0.31; 95% CI -0.56, -0.06).

Sub-group analyses (see sections 4, 5 and 6: Data and analyses)

Sub-group analyses were conducted on a priori determined groups of trials on the basis of setting (receiving formal drug treatment or not), gender (mixed or single gender group interventions) and the use of HIV testing.

Setting appeared to have some impact on the effectiveness of the intervention. Although there was some overlap in confidence intervals between the two sub-groups there appeared to be a small benefit for people engaged in treatment (RR = 1.42, 95% CI 1.14, 1.77; SMD = -0.28, 95% CI -0.44, -0.12) but less evidence of effectiveness for those not engaged in treatment (RR = 1.10, 95% CI 1.02, 1.18; SMD = 0.11, 95% CI -0.32, 0.54).

Trials conducted on specific gender groups (mainly females) appeared to be slightly more effective (RR = 1.32, 95% CI 1.12, 1.55; SMD = -0.38, 95% CI -0.63, -0.12) compared with mixed gender groups (RR = 1.09, 95% CI 1.01, 1.16; SMD = -0.01, 95% CI -0.25, 0.23) but there was overlap between confidence intervals.

The effects of the provision of HIV testing did not appear to have an impact on results. There was wide overlap between confidence intervals in those studies that reported the use of HIV testing for all participants.

Sensitivity analysis (see section 7: Data and analyses)

Study design did not appear to have a strong impact on results, the inclusion of only randomised controlled trials made little difference to the conclusions on estimate of effect.

DISCUSSION

It appears that formal multi-session psychosocial interventions are not more effective than briefer standard education. Therefore there is insufficient evidence to recommend the widespread use of formal multi-session psychosocial interventions to reduce the injection and sexual risk behaviours of drug users. However, this suggests the possible benefit of using brief educational interventions (in terms of cost-effectiveness and ease of implementation).

The very modest effect size we observed requires some comment.
First, the effect is based on the comparison of the intervention with a comparison condition that usually involved HIV counselling and testing and some form of HIV education. Ethical considerations relating to providing information needed to avoid a potentially fatal disease, and research considerations obtaining HIV prevalence data, typically required that subjects in the comparison condition receive these services. Inspection of the pre vs. post data in the studies generally showed substantial reported behavior change in both the intervention and comparison groups. Thus, the findings in this review should not be interpreted as indicating that the interventions were not effective, but rather that the interventions were not substantially more effective than the services provided to the comparison subjects.

A second consideration is based on the social nature of much injecting drug use. Many drug users frequently share information about sources of drugs, cooperate to obtain drugs, and use drugs together. Thus, they are also likely to share new information about AIDS, and these group discussions may promote risk reduction among members of both intervention and comparison groups (Des Jarlais 1995).

Finally, most of the studies did not conduct (or at least did not report conducting) needs assessments before conducting the intervention studies. It is possible that needs assessments would have led to modest differences in the interventions that might have produced much larger differences between the intervention and the comparison groups. Conducting such needs assessments before implementing the intervention studies, however, illustrates the ethical issues involved in HIV prevention research. If the needs assessment showed that the potential subjects had specific requirements for reducing their risk of acquiring HIV, then the researchers would have a very strong ethical imperative to provide the needed services to both intervention and control subjects.

The results of this systematic review are generally consistent with previous reviews (for example, Copenhaver 2006; Semaan 2002) suggesting minimal differences between more intensive multi-session psychosocial and standard educational interventions. Although Copenhaver 2006 suggested their meta-analysis indicated the efficacy of multi-session psychosocial (or behavioural interventions) their conclusions may have relied more on statistical significance than clinical significance. Additionally, inclusion of both minimal controls and brief educational comparators in the same analysis may have inflated the effect slightly. Similarly, Semaan 2002 found a relatively small effect size when comparing multi-session psychosocial interventions with other interventions and also found some benefit for multi-session psychosocial interventions compared with minimal interventions for sexual risk reduction.

There are several limitations to this review. All studies relied on self-report measures and so didn't include objective indicators such as HIV seroconversion rates. Secondly, most studies did not report intention-to-treat data which may have added bias to the results. Thirdly, most studies were conducted in North America therefore it may be questioned whether these findings can be extrapolated to other populations, such as developing countries, where the vast majority of injecting drug users reside. Finally, it could be argued, the inclusion of quasi-randomised studies may have introduced bias into the meta-analysis. However, a sensitivity analysis including only randomised trials found largely similar results.

AUTHORS' CONCLUSIONS

Implications for practice

There is insufficient evidence to recommend the widespread use of formal multi-session psychosocial interventions to reduce the injection and sexual risk behaviours of drug users. In addition, subgroup analyses suggest that those in formal drug treatment appear to be slightly more likely to reduce their risk behaviour but this still requires substantiating in randomised trials.

However, we would not want readers of this review to conclude that interventions to reduce risk behavior among IDUs are ineffective. Both standard education and formal multi-session psychosocial interventions were associated with reductions in risk behaviour. This is an important finding, both for people in developing and developed countries, as it suggests standard education interventions are likely to be a more cost-effective option for reducing HIV risk behaviour. This suggests brief standard education interventions should be a treatment option alongside other effective interventions. There is a general consensus that community outreach programs, programs to provide access to sterile injection equipment, and drug abuse treatment (particularly methadone maintenance treatment for heroin addiction) are effective in reducing risk behavior and HIV transmission among IDUs (National Institute for Health 1997; Institute of Medicine 2006). We would note that the greatest effects are likely to occur with "structural" interventions that are applied at the community level, with diffusion of information and materials for safer behavior (sterile injection equipment and condoms) throughout the local IDU population and the development of new social norms promoting safer behavior (Des Jarlais2000).

Implications for research

The emphasis on formal multi-session psychosocial interventions in the HIV risk reduction literature has resulted in a considerable evidence base on the efficacy of such approaches. However, the possible benefits of brief educational interventions have not received as much attention. The results of this systematic review suggest the importance of further research investigating the cost-effectiveness of brief standard education interventions and their implementation in developing world contexts.

However, brief standard education interventions may not be appropriate for all people so further research should also seek to identify if there are sub-groups of drug users (for example, people in formal drug treatment) likely to benefit from more intensive multi-session psychosocial interventions.

As discussed above, there are a number of limitations to the literature in this field. Firstly, there is a lack of research on reducing HIV risk behaviours in drug users in developing countries. Secondly, a particularly important limitation of the interventions that we reviewed is that the great majority are focused on the individual, and thus make no provisions for social reinforcement of new behaviors over time. Interventions focusing on change with social networks have found promising results (for example, Latkin 2003). Developing mechanisms for long-term social reinforement of behavior change is an area that deserves more attention in HIV behavior change research. A further limitation of the current literature concerns outcome assessment, our review of the literature suggests future studies require more objective measures of sexual and injection risk behaviour with longer follow up.

REFERENCES

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

AVANTS2004

Methods	Random assignment of individuals
Participants	220 participants receiving MMT in USA (46% were also cocaine dependent) Mean Age: 37 years

AVANTS2004 *(Continued)*

	Sex: 151 Males and 68 Females
Interventions	1. Psychoeducation:12 sessions of 90 min duration. Focused on information, motivation and behavioural skills 2. MI + Standard care: 1 session of MI followed by 2 hours counselling and case management per month
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	no blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

BAKER1993

Methods	Random assignment of individuals
Participants	95 participants who were IDUs receiving MMT in Australia Mean age: 31 years Sex: 44 males, 51 females 6 participants were HIV positive
Interventions	1. Psychoeducation: 6 sessions including MI and behavioural skills training 2. MI: 1 session of 60-90 min duration 3. Standard care: standard advice and self-help booklet
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	single blinded

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

BAKER1994

Methods	Random assignment of individuals
Participants	200 participants who were IDUs and attended a general medical centre in Australia

BAKER1994 *(Continued)*

	Age: 29 years
	Sex: 159 males, 41 females
Interventions	1. MI: 1 session for 30 mins
	2. Standard care
Outcomes	Injection risk behaviour
	Sexual risk behaviour
Notes	single blinded
	received HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

BAXTER1991

Methods	Random assignment of individuals
Participants	134 IDU participants in a US prison
Interventions	1. Psychoeducation: 6 sessions on injection and sexual risk reduction
	2. Control
Outcomes	Injection risk behaviour
	Sexual risk behaviour
Notes	No information on blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

COLON1993

Methods	Quasi-randomised assignment of individuals (based on day of admission)
Participants	1866 participants from 4 communities in Puerto Rico
	Mean Age: 33 years
	Sex: 1478 males, 378 females
Interventions	1. Psychoeducation: 3 sessions including street outreach and behavioural skills training

COLON1993 *(Continued)*

	2. Control
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	no blinding received HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

DEREN1995

Methods	Random assignment of individuals
Participants	1770 IDUs or their sex partners in USA Mean age: 35 years Sex: 71% males
Interventions	1. Psychoeducation: 3 sessions 2. Standard education: 1 session
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	994/1770 followed up No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

DUSHAY2001

Methods	Quasi-randomised assignment of individuals (every fifth [later third] African-american or Puerto-rican were assigned to standard)
Participants	539 Puerto-Rican or African American participants
Interventions	1. Psychoeducation: 3 sessions adjusted to be culturally appropriate for either Puerto-ricans or African Americans 2. Standard education: 2 sessions education on injection and sexual risk

DUSHAY2001 *(Continued)*

Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No information on blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

EL-BASSEL 1995

Methods	Random assignment of individuals
Participants	145 incarcerated women in USA Mean age: 33 years
Interventions	1. Psychoeducation:16 sessions of skill building 2. Standard education: 2 HIV/AIDS Information group sessions
Outcomes	Sexual risk behaviour
Notes	No information on blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

ELDRIDGE1997

Methods	Quasi-randomised assignment of individuals (based on day of admission)
Participants	104 participants receiving treatment in the criminal justice system in the USA Mean age: 34 years Sex: all female
Interventions	1. Psychoeducation: 6 sessions of behavioural skills training, education, 2. Standard education: 2 sessions
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	no information on blinding

ELDRIDGE1997 *(Continued)*

	received HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

GIBSON1999: Study 1

Methods	Random assignment of individuals
Participants	220 participants who had just completed opioid detoxification in USA Age range: 20-49 Sex: 204 males, 91 females
Interventions	1. Standard education: 1 session (50 mins) of education and problem solving 2. Self help booklet
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	no blinding HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

GIBSON1999: Study 2

Methods	Random assignment of individuals
Participants	76 participants who had just completed opioid detoxification in USA Age range: 20-49 years Sex: 44 males 22 females
Interventions	1. Standard education: 1 session (50 mins) of education and problem solving 2. Control: short interview (15 mins)
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

GIBSON1999: Study 2 *(Continued)*

	HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

HARRIS1998

Methods	Random assignment of individuals
Participants	204 participants who received MMT in USA Mean age: 36 years Sex: all females
Interventions	1. Psychoeducation: 16 sessions behavioural skills intervention specifically designed for women 2. Standard care: standard services within MMT
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

KOTRANSKI1998

Methods	Quasi-randomised assignment of individuals
Participants	417 IDU participants from USA Mean age: 39 years Sex: 265 males, 152 females
Interventions	1. Psychoeducation: 3 sessions behavioural skills 2. Standard education: 2 sessions
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

KOTRANSKI1998 *(Continued)*

	received HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

MALOW1994

Methods	Random assignment of individuals
Participants	152 participants from USA who were dependent on crack cocaine Mean age: 35 years Sex: all males
Interventions	1. Psychoeducation: 3 sessions on behavioural skills, stress reduction 2. Control: same content but minimal participant-therapist interaction
Outcomes	Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

MANDELL 1994

Methods	Random assignment of individuals
Participants	105 participants from USA not in formal drug treatment Mean age: 34 years Sex: 90 Males, 15 females
Interventions	1. Brief intervention: 1 hour session 2. Minimal intervention: 15 mins information
Outcomes	Injection risk behaviour
Notes	No mention of blinding received HIV testing

Risk of bias

MANDELL 1994 *(Continued)*

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

MARGOLIN2003

Methods	Random assignment of individuals
Participants	90 participants receiving MMT in USA Mean age: 41 years Sex: 63 males, 27 females
Interventions	1. Psychoeducation: 6 sessions behavioural skills and MI 2. Standard care: group counselling
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 1

Methods	Quasi-randomised assignment of individuals
Participants	531 participants not in drug treatment in USA Mean age: 35 years Sex: 361 males, 170 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement

NADR: Site 1 *(Continued)*

Allocation concealment?	Unclear risk	D - Not used

NADR: Site 10

Methods	Quasi-randomised assignment of individuals
Participants	131 participants not in drug treatment in USA Mean age: 34 years Sex: 96 males, 35 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 14

Methods	Quasi-randomised assignment of individuals
Participants	143 participants not in drug treatment in USA Mean age: 35 years Sex: 120 males, 23 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 16

Methods	Quasi-randomised assignment of individuals
Participants	343 participants not in drug treatment in the USA Mean age: 35 years Sex: 244 males, 99 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 17

Methods	Quasi-randomised assignment of individuals
Participants	884 participants not in drug treatment in the USA Mean age: 34 years Sex: 628 males, 256 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding Very high attrition: 76% therefore not included in meta-analysis

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 18

Methods	Quasi-randomised assignment of individuals
Participants	177 participants not in drug treatment in the USA Mean age: 38 years Sex: 124 males, 53 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding Very high attrition: 93% therefore not included in the meta-analysis

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 19

Methods	Quasi-randomised assignment of individuals
Participants	317 participants not in drug treatment in the USA Mean age: 34 years Sex: 225 males, 92 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 20

Methods	Quasi-randomised assignment of individuals

NADR: Site 20 *(Continued)*

Participants	276 participants not in drug treatment in the USA Mean age: 33 years Sex: 182 males, 94 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

NADR: Site 4

Methods	Quasi-randomised assignment of individuals
Participants	540 participants not in drug treatment in the USA Mean age: 37 years Sex: 357 males, 183 females
Interventions	1. Psychoeducation 2. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

ONEILL1996

Methods	Random assignment of individuals
Participants	92 participants who were IDUs and receiving MMT in Australia Mean age: 26 years

ONEILL1996 *(Continued)*

	Sex: all females
Interventions	1. Psychoeducation: MI (1 session) and behavioural skills training (5 sessions 2. Standard care
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	Single blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

ROBLES2004

Methods	Random assignment of individuals
Participants	557 participants who were IDUs and over 18 years old living in Puerto Rico. Mean age: 34.4% under 25 years, 36.6% 25-34 years, 29.0% over 35 years Sex: 498 males, 59 females
Interventions	1. Psychoeducation: 6 sessions, including MI and behavioural skills training. Each session was followed by case management . 2. Standard education: 2 sessions of education/discussion on HIV/AIDS as a disease, discussion of safe needle and safe sex skills, offer of HIV test
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

SCHILLING1991

Methods	Random assignment of individuals
Participants	91 participants receiving MMT in USA Age range: 21-42 years

SCHILLING1991 *(Continued)*

	Sex: all females
Interventions	1. Psychoeducation: 5 sessions on education and behavioural skills 2. Standard education: standard information provided at clinic
Outcomes	Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

SIEGAL1995

Methods	Random assignment of individuals
Participants	381 participants recruited in a needle exchange programme in USA Mean age: 37 years Sex: 282 males, 99 females
Interventions	1. Psychoeducation: 4 sessions on education and behavioural skills 2. Enhanced Standard care: 1 session education and behavioural skills training
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

SORENSEN1994: Detox

Methods	Random assignment of individuals
Participants	60 participants receiving opiate detoxification in USA
Interventions	1. Psychoeducation: 2 sessions (first for4 hours and last for 2hours) education and behavioural skills training

SORENSEN1994: Detox *(Continued)*

	2. Control
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate (used sealed envelopes)

SORENSEN1994: MMT

Methods	Random assignment of individuals
Participants	50 participants receiving MTT in USA Mean age: 40 years Sex: 33 males and 17 females
Interventions	1. Psychoeducation: 3 sessions education and behavioural skills training 2. Control
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate (used sealed envelopes)

STEIN2002

Methods	Random assignment of individuals
Participants	109 participants from USA who were IDUs and also exhibited hazardous or harmful alcohol use Mean age: 36 years Sex: 68 males 41 females
Interventions	1. Brief intervention: 2 sessions of motivational interviewing 2. Control
Outcomes	Injection risk behaviour

STEIN2002 *(Continued)*

Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

STERK2003

Methods	Random assignment of individuals
Participants	68 participants who were IDUs in USA Mean age: 41 years Sex: all females
Interventions	1. Psychoeducation (motivation-focused): 4 sessions on education and reducing ambivalence 2. Psychoeducation(behavioural focused): 4 sessions on education and behavioural skills training 3. Standard education
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No blinding HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

TUCKER2004

Methods	Random assignment of individuals
Participants	145 participants who were IDUs in Australia Mean age:31 years Sex: 84 males, 21 females
Interventions	1. MI: 1 session 2. self help booklet
Outcomes	Injection risk behaviour Sexual risk behaviour

TUCKER2004 *(Continued)*

Notes	Single blinding

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate (used sealed envelopes)

WECHSBERG2004

Methods	Random assignment of individuals
Participants	620 African-American women participants who were crack cocaine dependent Mean age: 37 years Sex: all females
Interventions	1. Psychoeducation: 4 sessions on education and behavioural skills training 2. Standard education 3. Waitlist
Outcomes	Injection risk behaviour Sexual risk behaviour
Notes	No mention of blinding HIV testing

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	D - Not used

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Boatler 1994	pre-post analysis with inadequate controls
Booth 1996	aim of intervention not focused on HIV risk prevention
Booth 2004	no extractable data
CDC 1999	intervention conducted at the community level
Choopanya 2003	pre-post analysis with inadequate controls

Study	Reason for exclusion
Compton 1998	not relevant comparison
Compton 2000	not relevant comparison
Conrad 1998	primarily addressing alcohol misuse
El-Bassel 2005	no adequate controls
Epstein2003	not primarily aimed at reducing HIV risk behaviours
Heil 2005	no behavioural outcomes
Hershberger 2003	not RCT
Kwiatkowski 1999	not analysed by original groups
Latkin 1996	structural interventions
Latkin 2003	structural interventions
Linderberg 2002	not primarily addressing people who misuse drugs
Malow 1992	did not directly assess behavioural outcomes
Martin 2001	did not assess required behavioural outcomes
McCoy 1996	no extractable data
McCusker 1992	no extractable data
Rhodes 1994	no clear information on group assignment
Sherman 2006	no control group
Simpson 1994	no extractable data for intervention vs control
St Lawrence 1997	no behavioural outcomes
Sterk 2003	no extractable data

DATA AND ANALYSES

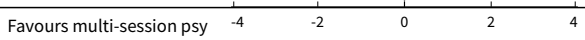
Comparison 1. Multi-session psychosocial interventions versus Standard education

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Injection risk behaviour (3-6 month follow up))	6	1044	Std. Mean Difference (IV, Random, 95% CI)	-0.04 [-0.31, 0.23]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2 Injection risk behaviour (follow up > 6months)	1	73	Std. Mean Difference (IV, Fixed, 95% CI)	-0.81 [-1.29, -0.33]
3 safer injection behaviour (3-6 month follow up)	13	6562	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.95, 1.11]
3.1 ITT	4	3108	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.91, 1.11]
3.2 Completers	9	3454	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.93, 1.15]
4 Sexual risk behaviour (3-6 month follow up)	6	1050	Std. Mean Difference (IV, Random, 95% CI)	-0.12 [-0.33, 0.08]
5 Sexual risk behaviour (> 6 months follow up)	2	203	Std. Mean Difference (IV, Fixed, 95% CI)	0.02 [-0.25, 0.30]
6 Safer sexual behaviour (3-6 month follow up)	14	3731	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.98, 1.13]
6.1 ITT	7	1541	Risk Ratio (M-H, Random, 95% CI)	1.16 [0.95, 1.42]
6.2 Completers	7	2190	Risk Ratio (M-H, Random, 95% CI)	1.02 [0.96, 1.10]
7 Safer risk behaviour (> 6 month follow up)	1	412	Risk Ratio (M-H, Fixed, 95% CI)	1.14 [0.89, 1.46]
8 Injection and Sexual risk behaviour (combined)	17	5763	Risk Ratio (M-H, Random, 95% CI)	1.12 [1.04, 1.20]
9 Injection and sexual risk behaviour (combined)	11	1427	Std. Mean Difference (IV, Random, 95% CI)	-0.17 [-0.37, 0.03]

Analysis 1.1. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 1 Injection risk behaviour (3-6 month follow up)).

Study or subgroup	Multi-session psychosoc		Standard education		Std. Mean Difference	Weight	Std. Mean Difference
	N	Mean(SD)	N	Mean(SD)	Random, 95% CI		Random, 95% CI
AVANTS2004	93	0.1 (0.3)	97	0.2 (1)		20.17%	-0.16[-0.44,0.13]
BAKER1993	28	-0.8 (5.5)	25	-0.7 (5.5)		12.83%	-0.03[-0.56,0.51]
BAXTER1991	86	17.3 (2.6)	48	15.8 (2.6)		17.82%	0.56[0.21,0.92]
DUSHAY2001	453	-0.4 (0.9)	86	-0.4 (0.9)		21.83%	0.01[-0.22,0.24]
ONEILL1996	40	-4 (6.1)	40	-1.1 (6.3)		15.31%	-0.46[-0.91,-0.02]
STERK2003	21	-2.6 (10.9)	27	-0.3 (1.7)		12.03%	-0.31[-0.88,0.26]
Total ***	**721**		**323**			**100%**	**-0.04[-0.31,0.23]**
Heterogeneity: Tau^2=0.07; Chi^2=15.94, df=5(P=0.01); I^2=68.63%							
Test for overall effect: Z=0.29(P=0.77)							



Favours multi-session psy Favours standard ed

Analysis 1.2. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 2 Injection risk behaviour (follow up > 6months).

Study or subgroup	Multi-session psychosoc		Standard education		Std. Mean Difference	Weight	Std. Mean Difference
	N	Mean(SD)	N	Mean(SD)	Fixed, 95% CI		Fixed, 95% CI
ONEILL1996	37	-4.7 (5.7)	36	0.5 (7.2)		100%	-0.81[-1.29,-0.33]
Total ***	**37**		**36**			**100%**	**-0.81[-1.29,-0.33]**
Heterogeneity: Not applicable							
Test for overall effect: Z=3.31(P=0)							

Analysis 1.3. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 3 safer injection behaviour (3-6 month follow up).

Study or subgroup	Multi-session psychosoc	Standard education	Risk Ratio	Weight	Risk Ratio
	n/N	n/N	M-H, Random, 95% CI		M-H, Random, 95% CI
1.3.1 ITT					
COLON1993	186/880	185/986		7.91%	1.13[0.94,1.35]
KOTRANSKI1998	196/327	160/268		10.14%	1[0.88,1.15]
MARGOLIN2003	27/45	24/45		3.32%	1.13[0.78,1.62]
ROBLES2004	140/285	148/272		8.82%	0.9[0.77,1.06]
Subtotal (95% CI)	**1537**	**1571**		**30.18%**	**1.01[0.91,1.11]**
Total events: 549 (Multi-session psychosoc), 517 (Standard education)					
Heterogeneity: Tau^2=0; Chi^2=3.71, df=3(P=0.29); I^2=19.18%					
Test for overall effect: Z=0.17(P=0.87)					
1.3.2 Completers					
DEREN1995	200/267	225/304		11.91%	1.01[0.92,1.11]
NADR: Site 1	174/229	216/300		11.66%	1.06[0.95,1.17]
NADR: Site 10	26/44	19/50		2.51%	1.56[1.01,2.39]
NADR: Site 14	29/65	30/72		3.02%	1.07[0.73,1.57]
NADR: Site 16	155/209	77/118		9.12%	1.14[0.97,1.33]
NADR: Site 19	143/216	70/99		8.91%	0.94[0.8,1.1]
NADR: Site 20	92/138	62/110		7.13%	1.18[0.97,1.45]
NADR: Site 4	132/259	126/281		8.14%	1.14[0.95,1.36]
SIEGAL1995	109/348	155/345		7.42%	0.7[0.57,0.85]
Subtotal (95% CI)	**1775**	**1679**		**69.82%**	**1.03[0.93,1.15]**
Total events: 1060 (Multi-session psychosoc), 980 (Standard education)					
Heterogeneity: Tau^2=0.01; Chi^2=25.6, df=8(P=0); I^2=68.74%					
Test for overall effect: Z=0.66(P=0.51)					
Total (95% CI)	**3312**	**3250**		**100%**	**1.03[0.95,1.11]**
Total events: 1609 (Multi-session psychosoc), 1497 (Standard education)					
Heterogeneity: Tau^2=0.01; Chi^2=29.16, df=12(P=0); I^2=58.85%					
Test for overall effect: Z=0.71(P=0.48)					
Test for subgroup differences: Not applicable					

Analysis 1.4. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 4 Sexual risk behaviour (3-6 month follow up).

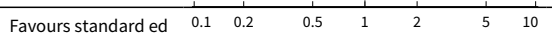
Study or subgroup	Multi-session psychosoc		Standard education		Std. Mean Difference	Weight	Std. Mean Difference
	N	Mean(SD)	N	Mean(SD)	Random, 95% CI		Random, 95% CI
AVANTS2004	93	2.4 (3.4)	97	3.7 (3.9)		21.45%	-0.34[-0.63,-0.06]
BAKER1993	28	0.1 (4.4)	25	-0.1 (5.1)		10.57%	0.05[-0.49,0.59]
DUSHAY2001	453	-0.5 (1.1)	86	-0.7 (1.3)		25.02%	0.13[-0.1,0.36]
ELDRIDGE1997	29	-0.3 (1.3)	29	0.4 (1.2)		11%	-0.53[-1.06,-0.01]
HARRIS1998	73	-0 (1.5)	57	0 (1.5)		18.08%	-0.03[-0.38,0.31]
ONEILL1996	40	-1.4 (4.7)	40	-0.7 (4)		13.88%	-0.17[-0.61,0.27]
Total * **	**716**		**334**			**100%**	**-0.12[-0.33,0.08]**
Heterogeneity: Tau^2=0.03; Chi^2=9.77, df=5(P=0.08); I^2=48.82%							
Test for overall effect: Z=1.17(P=0.24)							

Analysis 1.5. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 5 Sexual risk behaviour (> 6 months follow up).

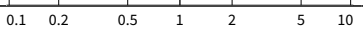
Study or subgroup	Multi-session psychosoc		Standard education		Std. Mean Difference	Weight	Std. Mean Difference
	N	Mean(SD)	N	Mean(SD)	Fixed, 95% CI		Fixed, 95% CI
HARRIS1998	73	-0 (1)	57	0 (1)		63.76%	-0.05[-0.4,0.3]
ONEILL1996	37	-0.8 (4.9)	36	-1.5 (4.2)		36.24%	0.16[-0.3,0.61]
Total * **	**110**		**93**			**100%**	**0.02[-0.25,0.3]**
Heterogeneity: Tau^2=0; Chi^2=0.49, df=1(P=0.48); I^2=0%							
Test for overall effect: Z=0.17(P=0.86)							

Analysis 1.6. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 6 Safer sexual behaviour (3-6 month follow up).

Study or subgroup	Multi-session psychosoc	Standard education	Risk Ratio	Weight	Risk Ratio
	n/N	n/N	M-H, Random, 95% CI		M-H, Random, 95% CI
1.6.1 ITT					
EL-BASSEL 1995	34/67	32/78		3.59%	1.24[0.87,1.77]
ELDRIDGE1997	14/51	5/48		0.59%	2.64[1.03,6.76]
KOTRANSKI1998	112/327	107/268		7.89%	0.86[0.7,1.06]
MALOW1994	40/76	31/76		3.78%	1.29[0.91,1.82]
MARGOLIN2003	27/45	21/45		3.03%	1.29[0.87,1.9]
STERK2003	3/21	5/27		0.31%	0.77[0.21,2.87]
WECHSBERG2004	80/213	61/199		5.52%	1.23[0.93,1.61]
Subtotal (95% CI)	**800**	**741**		**24.71%**	**1.16[0.95,1.42]**
Total events: 310 (Multi-session psychosoc), 262 (Standard education)					



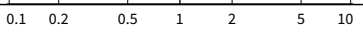
Study or subgroup	Multi-session psychosoc n/N	Standard education n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Heterogeneity: Tau²=0.03; Chi²=11.42, df=6(P=0.08); I²=47.46%					
Test for overall effect: Z=1.5(P=0.13)					
1.6.2 Completers					
NADR: Site 1	158/229	225/300		14.9%	0.92[0.83,1.03]
NADR: Site 10	26/44	33/50		4.35%	0.9[0.65,1.23]
NADR: Site 14	44/65	39/72		5.54%	1.25[0.95,1.64]
NADR: Site 16	171/209	93/118		14.49%	1.04[0.93,1.16]
NADR: Site 19	140/216	66/99		10.11%	0.97[0.82,1.15]
NADR: Site 20	112/138	80/110		12.29%	1.12[0.97,1.28]
NADR: Site 4	174/259	177/281		13.61%	1.07[0.94,1.21]
Subtotal (95% CI)	**1160**	**1030**		**75.29%**	**1.02[0.96,1.1]**
Total events: 825 (Multi-session psychosoc), 713 (Standard education)					
Heterogeneity: Tau²=0; Chi²=8.77, df=6(P=0.19); I²=31.56%					
Test for overall effect: Z=0.68(P=0.5)					
Total (95% CI)	**1960**	**1771**		**100%**	**1.05[0.98,1.13]**
Total events: 1135 (Multi-session psychosoc), 975 (Standard education)					
Heterogeneity: Tau²=0.01; Chi²=21.39, df=13(P=0.07); I²=39.22%					
Test for overall effect: Z=1.3(P=0.19)					
Test for subgroup differences: Not applicable					



Favours standard ed — Favours multi-session psy

Analysis 1.7. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 7 Safer risk behaviour (> 6 month follow up).

Study or subgroup	Multi-session psychosoc n/N	Standard education n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
WECHSBERG2004	88/213	72/199		100%	1.14[0.89,1.46]
Total (95% CI)	**213**	**199**		**100%**	**1.14[0.89,1.46]**
Total events: 88 (Multi-session psychosoc), 72 (Standard education)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.06(P=0.29)					



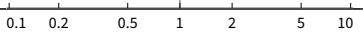
Favours standard ed — Favours multi-session psy

Analysis 1.8. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 8 Injection and Sexual risk behaviour (combined).

Study or subgroup	Multi-session psychosoc n/N	Standard education n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
COLON1993	101/483	62/547		3.78%	1.84[1.38,2.47]
DEREN1995	152/267	185/304		8.06%	0.94[0.81,1.07]
EL-BASSEL 1995	34/67	32/78		2.83%	1.24[0.87,1.77]

Favours standard ed — Favours multi-session psy

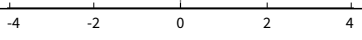
Study or subgroup	Multi-session psychosoc n/N	Standard education n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
ELDRIDGE1997	18/51	9/48		0.9%	1.88[0.94,3.78]
KOTRANSKI1998	196/233	160/184		10.32%	0.97[0.89,1.05]
MALOW1994	52/76	40/76		4.34%	1.3[1,1.69]
MARGOLIN2003	25/45	15/45		1.69%	1.67[1.02,2.72]
NADR: Site 1	174/229	216/300		9.48%	1.06[0.95,1.17]
NADR: Site 10	26/44	19/50		2.09%	1.56[1.01,2.39]
NADR: Site 14	28/65	30/72		2.45%	1.03[0.7,1.53]
NADR: Site 16	155/209	77/118		7.45%	1.14[0.97,1.33]
NADR: Site 19	140/216	66/99		6.87%	0.97[0.82,1.15]
NADR: Site 20	112/138	80/110		7.98%	1.12[0.97,1.28]
NADR: Site 4	174/259	177/281		8.61%	1.07[0.94,1.21]
ROBLES2004	140/148	148/168		10.71%	1.07[1,1.15]
SIEGAL1995	108/149	152/232		8.13%	1.11[0.97,1.27]
WECHSBERG2004	80/186	61/186		4.31%	1.31[1.01,1.71]
Total (95% CI)	**2865**	**2898**		**100%**	**1.12[1.04,1.2]**
Total events: 1715 (Multi-session psychosoc), 1529 (Standard education)					
Heterogeneity: Tau^2=0.01; Chi^2=44.47, df=16(P=0); I^2=64.02%					
Test for overall effect: Z=3.16(P=0)					



Favours standard ed — Favours multi-session psy

Analysis 1.9. Comparison 1 Multi-session psychosocial interventions versus Standard education, Outcome 9 Injection and sexual risk behaviour (combined).

Study or subgroup	Multi-session psychosoc N	Mean(SD)	Standard education N	Mean(SD)	Std. Mean Difference Random, 95% CI	Weight	Std. Mean Difference Random, 95% CI
AVANTS2004	93	0.1 (0.3)	97	0.2 (1)		11.91%	-0.16[-0.44,0.13]
BAKER1993	27	-0.8 (5.5)	23	0.2 (5.8)		7.05%	-0.17[-0.73,0.39]
BAXTER1991	86	17.3 (2.8)	48	15.8 (2.8)		10.42%	0.54[0.18,0.9]
DUSHAY2001	453	-0.4 (0.9)	86	-0.4 (0.9)		13%	0.01[-0.22,0.24]
ELDRIDGE1997	29	-0.3 (1.3)	29	0.4 (1.2)		7.53%	-0.53[-1.06,-0.01]
HARRIS1998	73	-0 (1.5)	57	-0 (1.5)		10.67%	-0.02[-0.37,0.33]
ONEILL1996	40	-4 (6.1)	40	-1.1 (6.3)		8.83%	-0.46[-0.91,-0.02]
SCHILLING1991	48	-2.6 (1.2)	43	-1.8 (1.2)		9.21%	-0.66[-1.08,-0.24]
SORENSEN1994: Detox	32	-16.4 (70.8)	28	-2.3 (58.6)		7.77%	-0.21[-0.72,0.3]
SORENSEN1994: MMT	25	-5.5 (71.2)	22	11.3 (46.6)		6.8%	-0.27[-0.85,0.31]
STERK2003	21	-2.6 (10.9)	27	-0.3 (1.7)		6.83%	-0.31[-0.88,0.26]
Total ***	**927**		**500**			**100%**	**-0.17[-0.37,0.03]**
Heterogeneity: Tau^2=0.07; Chi^2=26.29, df=10(P=0); I^2=61.96%							
Test for overall effect: Z=1.71(P=0.09)							



Favours multi-session psy — Favours standard ed

Comparison 2. Standard education versus Minimal Control

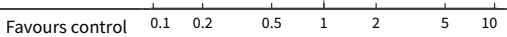
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Safer injection risk behaviour (3-6 month follow up)	4	510	Risk Ratio (M-H, Fixed, 95% CI)	1.10 [0.92, 1.31]
2 Safer sexual risk behaviour (3-6 months follow up)	2	296	Risk Ratio (M-H, Fixed, 95% CI)	1.07 [0.70, 1.64]
3 Injection risk behaviour (3-6 months follow up)	3	262	Std. Mean Difference (IV, Fixed, 95% CI)	-0.06 [-0.30, 0.19]
4 Sexual risk behaviour (3-6 months follow up)	3	263	Std. Mean Difference (IV, Fixed, 95% CI)	-0.10 [-0.34, 0.14]

Analysis 2.1. Comparison 2 Standard education versus Minimal Control, Outcome 1 Safer injection risk behaviour (3-6 month follow up).

Study or subgroup	Brief n/N	Control n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
GIBSON1999: Study 1	12/105	16/115		15.33%	0.82[0.41,1.65]
GIBSON1999: Study 2	29/38	28/38		28.1%	1.04[0.8,1.34]
MANDELL 1994	32/56	26/49		27.84%	1.08[0.76,1.52]
STEIN2002	42/60	26/49		28.73%	1.32[0.97,1.8]
Total (95% CI)	**259**	**251**		**100%**	**1.1[0.92,1.31]**
Total events: 115 (Brief), 96 (Control)					
Heterogeneity: Tau^2=0; Chi^2=2.21, df=3(P=0.53); I^2=0%					
Test for overall effect: Z=0.99(P=0.32)					

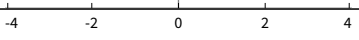
Analysis 2.2. Comparison 2 Standard education versus Minimal Control, Outcome 2 Safer sexual risk behaviour (3-6 months follow up).

Study or subgroup	Brief Intervention n/N	Control n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
GIBSON1999: Study 1	25/105	25/115		74.89%	1.1[0.67,1.78]
GIBSON1999: Study 2	8/38	8/38		25.11%	1[0.42,2.39]
Total (95% CI)	**143**	**153**		**100%**	**1.07[0.7,1.64]**
Total events: 33 (Brief Intervention), 33 (Control)					
Heterogeneity: Tau^2=0; Chi^2=0.03, df=1(P=0.86); I^2=0%					
Test for overall effect: Z=0.32(P=0.75)					



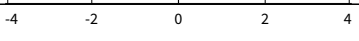
Analysis 2.3. Comparison 2 Standard education versus Minimal Control, Outcome 3 Injection risk behaviour (3-6 months follow up).

Study or subgroup	Brief intervention N	Brief intervention Mean(SD)	Control N	Control Mean(SD)	Std. Mean Difference Fixed, 95% CI	Weight	Std. Mean Difference Fixed, 95% CI
BAKER1993	25	-0.7 (5.5)	27	0.2 (5.8)		19.82%	-0.14[-0.69,0.4]
BAKER1994	42	-1.7 (5.5)	46	-1.2 (5.8)		33.58%	-0.09[-0.51,0.33]
TUCKER2004	64	-5.6 (10.9)	58	-5.6 (10.6)		46.59%	0[-0.35,0.36]
Total ***	**131**		**131**			**100%**	**-0.06[-0.3,0.19]**
Heterogeneity: Tau^2=0; Chi^2=0.24, df=2(P=0.89); I^2=0%							
Test for overall effect: Z=0.46(P=0.64)							



Analysis 2.4. Comparison 2 Standard education versus Minimal Control, Outcome 4 Sexual risk behaviour (3-6 months follow up).

Study or subgroup	Brief intervention N	Brief intervention Mean(SD)	Control N	Control Mean(SD)	Std. Mean Difference Fixed, 95% CI	Weight	Std. Mean Difference Fixed, 95% CI
BAKER1993	25	-0.1 (5.1)	27	-0.3 (5.1)		19.83%	0.03[-0.51,0.58]
BAKER1994	42	-0.7 (4.5)	46	-0.6 (5.1)		33.54%	-0.03[-0.45,0.39]
TUCKER2004	64	-2.4 (8.6)	59	-0.8 (6.4)		46.64%	-0.21[-0.56,0.15]
Total ***	**131**		**132**			**100%**	**-0.1[-0.34,0.14]**
Heterogeneity: Tau^2=0; Chi^2=0.7, df=2(P=0.7); I^2=0%							
Test for overall effect: Z=0.81(P=0.42)							

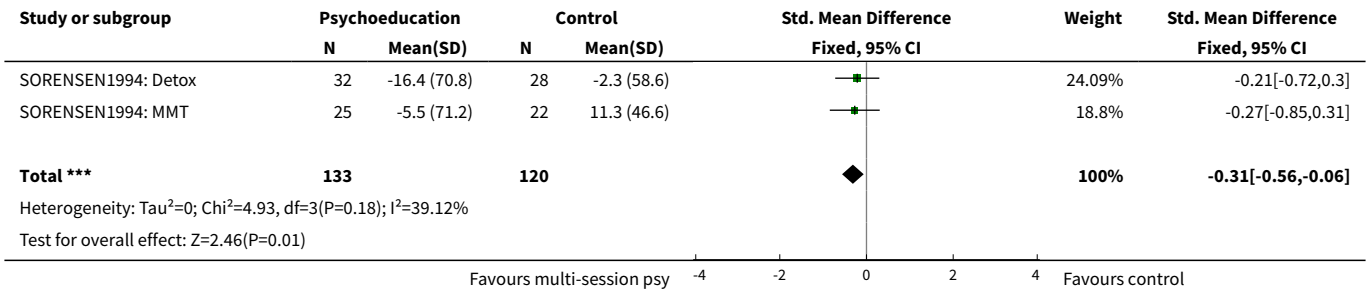


Comparison 3. Multi-session psychosocial intervention versus Minimal Control

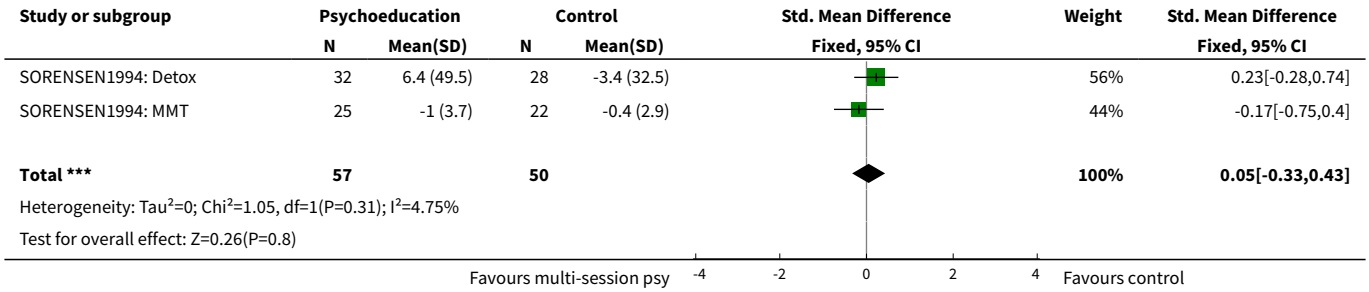
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Sexual risk behaviour	4	253	Std. Mean Difference (IV, Fixed, 95% CI)	-0.31 [-0.56, -0.06]
2 Injection risk behaviour	2	107	Std. Mean Difference (IV, Fixed, 95% CI)	0.05 [-0.33, 0.43]
3 Safer sexual behaviour	1	420	Risk Ratio (M-H, Fixed, 95% CI)	1.34 [1.03, 1.73]

Analysis 3.1. Comparison 3 Multi-session psychosocial intervention versus Minimal Control, Outcome 1 Sexual risk behaviour.

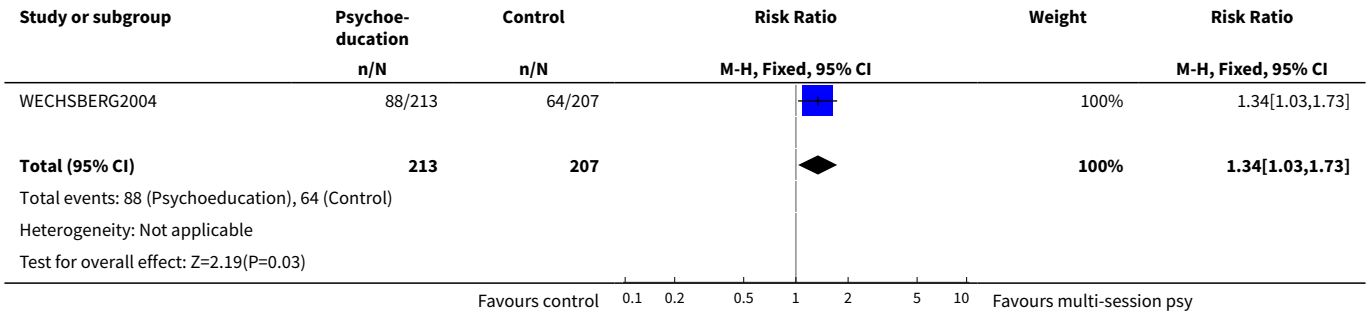
Study or subgroup	Psychoeducation N	Psychoeducation Mean(SD)	Control N	Control Mean(SD)	Std. Mean Difference Fixed, 95% CI	Weight	Std. Mean Difference Fixed, 95% CI
BAKER1993	28	0.1 (4.4)	27	-0.3 (5.1)		22.28%	0.08[-0.45,0.61]
SCHILLING1991	48	-2.6 (1.2)	43	-1.8 (1.2)		34.82%	-0.66[-1.08,-0.24]



Analysis 3.2. Comparison 3 Multi-session psychosocial intervention versus Minimal Control, Outcome 2 Injection risk behaviour.



Analysis 3.3. Comparison 3 Multi-session psychosocial intervention versus Minimal Control, Outcome 3 Safer sexual behaviour.



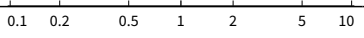
Comparison 4. Multi-session psychosocial intervention vs Standard education (sub-group analysis by setting)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Injection and Sexual risk behaviour (combined)	16	5618	Risk Ratio (M-H, Random, 95% CI)	1.13 [1.05, 1.22]
1.1 in formal drug treatment	3	341	Risk Ratio (M-H, Random, 95% CI)	1.42 [1.14, 1.77]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.2 not in formal drug treatment	13	5277	Risk Ratio (M-H, Random, 95% CI)	1.10 [1.02, 1.18]
2 Injection and sexual risk behaviour (combined)	11	1427	Std. Mean Difference (IV, Random, 95% CI)	-0.17 [-0.37, 0.03]
2.1 in formal drug treatment	8	706	Std. Mean Difference (IV, Random, 95% CI)	-0.28 [-0.44, -0.12]
2.2 not in formal drug treatment	3	721	Std. Mean Difference (IV, Random, 95% CI)	0.11 [-0.32, 0.54]

Analysis 4.1. Comparison 4 Multi-session psychosocial intervention vs Standard education (sub-group analysis by setting), Outcome 1 Injection and Sexual risk behaviour (combined).

Study or subgroup	Psychoeducation n/N	Standard education n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
4.1.1 in formal drug treatment					
ELDRIDGE1997	18/51	9/48		1.07%	1.88[0.94,3.78]
MALOW1994	52/76	40/76		4.89%	1.3[1,1.69]
MARGOLIN2003	25/45	15/45		1.98%	1.67[1.02,2.72]
Subtotal (95% CI)	**172**	**169**		**7.94%**	**1.42[1.14,1.77]**
Total events: 95 (Psychoeducation), 64 (Standard education)					
Heterogeneity: Tau^2=0; Chi^2=1.58, df=2(P=0.45); I^2=0%					
Test for overall effect: Z=3.12(P=0)					
4.1.2 not in formal drug treatment					
COLON1993	101/483	62/547		4.29%	1.84[1.38,2.47]
DEREN1995	152/267	185/304		8.56%	0.94[0.81,1.07]
KOTRANSKI1998	196/233	160/184		10.59%	0.97[0.89,1.05]
NADR: Site 1	174/229	216/300		9.85%	1.06[0.95,1.17]
NADR: Site 10	26/44	19/50		2.44%	1.56[1.01,2.39]
NADR: Site 14	28/65	30/72		2.84%	1.03[0.7,1.53]
NADR: Site 16	155/209	77/118		7.99%	1.14[0.97,1.33]
NADR: Site 19	140/216	66/99		7.43%	0.97[0.82,1.15]
NADR: Site 20	92/138	62/110		6.43%	1.18[0.97,1.45]
NADR: Site 4	132/259	126/281		7.24%	1.14[0.95,1.36]
ROBLES2004	140/148	148/168		10.93%	1.07[1,1.15]
SIEGAL1995	108/149	152/232		8.62%	1.11[0.97,1.27]
WECHSBERG2004	80/186	61/186		4.85%	1.31[1.01,1.71]
Subtotal (95% CI)	**2626**	**2651**		**92.06%**	**1.1[1.02,1.18]**
Total events: 1524 (Psychoeducation), 1364 (Standard education)					
Heterogeneity: Tau^2=0.01; Chi^2=35.95, df=12(P=0); I^2=66.62%					
Test for overall effect: Z=2.57(P=0.01)					
Total (95% CI)	**2798**	**2820**		**100%**	**1.13[1.05,1.22]**
Total events: 1619 (Psychoeducation), 1428 (Standard education)					
Heterogeneity: Tau^2=0.01; Chi^2=45.96, df=15(P<0.0001); I^2=67.36%					
Test for overall effect: Z=3.16(P=0)					
Test for subgroup differences: Not applicable					



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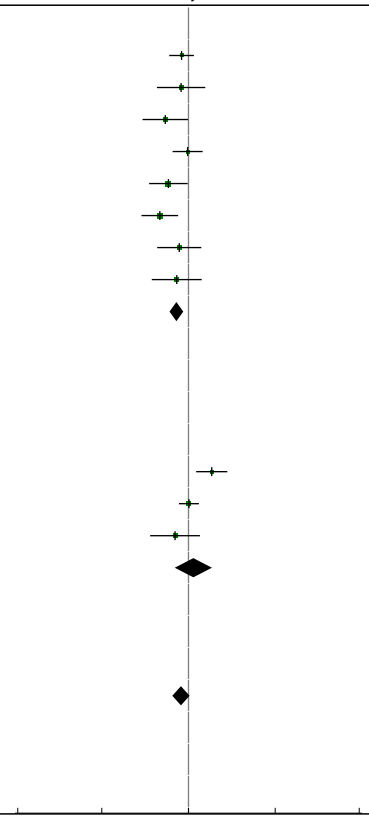
Analysis 4.2. Comparison 4 Multi-session psychosocial intervention vs Standard education (sub-group analysis by setting), Outcome 2 Injection and sexual risk behaviour (combined).

Study or subgroup	Psychoeducation N	Psychoeducation Mean(SD)	Standard education N	Standard education Mean(SD)	Std. Mean Difference Random, 95% CI	Weight	Std. Mean Difference Random, 95% CI
4.2.1 in formal drug treatment							
AVANTS2004	93	0.1 (0.3)	97	0.2 (1)		11.91%	-0.16[-0.44,0.13]
BAKER1993	27	-0.8 (5.5)	23	0.2 (5.8)		7.05%	-0.17[-0.73,0.39]
ELDRIDGE1997	29	-0.3 (1.3)	29	0.4 (1.2)		7.53%	-0.53[-1.06,-0.01]
HARRIS1998	73	-0 (1.5)	57	-0 (1.5)		10.67%	-0.02[-0.37,0.33]
ONEILL1996	40	-4 (6.1)	40	-1.1 (6.3)		8.83%	-0.46[-0.91,-0.02]
SCHILLING1991	48	-2.6 (1.2)	43	-1.8 (1.2)		9.21%	-0.66[-1.08,-0.24]
SORENSEN1994: Detox	32	-16.4 (70.8)	28	-2.3 (58.6)		7.77%	-0.21[-0.72,0.3]
SORENSEN1994: MMT	25	-5.5 (71.2)	22	11.3 (46.6)		6.8%	-0.27[-0.85,0.31]
Subtotal ***	**367**		**339**			**69.76%**	**-0.28[-0.44,-0.12]**
Heterogeneity: Tau^2=0.01; Chi^2=7.74, df=7(P=0.36); I^2=9.53%							
Test for overall effect: Z=3.44(P=0)							
4.2.2 not in formal drug treatment							
BAXTER1991	86	17.3 (2.8)	48	15.8 (2.8)		10.42%	0.54[0.18,0.9]
DUSHAY2001	453	-0.4 (0.9)	86	-0.4 (0.9)		13%	0.01[-0.22,0.24]
STERK2003	21	-2.6 (10.9)	27	-0.3 (1.7)		6.83%	-0.31[-0.88,0.26]
Subtotal ***	**560**		**161**			**30.24%**	**0.11[-0.32,0.54]**
Heterogeneity: Tau^2=0.11; Chi^2=8.18, df=2(P=0.02); I^2=75.56%							
Test for overall effect: Z=0.51(P=0.61)							
Total ***	**927**		**500**			**100%**	**-0.17[-0.37,0.03]**
Heterogeneity: Tau^2=0.07; Chi^2=26.29, df=10(P=0); I^2=61.96%							
Test for overall effect: Z=1.71(P=0.09)							
Test for subgroup differences: Chi^2=10.37, df=1 (P=0), I^2=90.36%							



Comparison 5. Multi-session psychosocial intervention versus Standard education (subgroup analysis by gender)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Injection and Sexual risk behaviour (combined)	17	5763	Risk Ratio (M-H, Random, 95% CI)	1.12 [1.04, 1.20]
1.1 mixed gender groups	13	4995	Risk Ratio (M-H, Random, 95% CI)	1.09 [1.01, 1.16]
1.2 single gender groups	4	768	Risk Ratio (M-H, Random, 95% CI)	1.32 [1.12, 1.55]
2 Injection and sexual risk behaviour (combined)	11	1427	Std. Mean Difference (IV, Random, 95% CI)	-0.17 [-0.37, 0.03]
2.1 mixed gender groups	6	1020	Std. Mean Difference (IV, Random, 95% CI)	-0.01 [-0.25, 0.23]

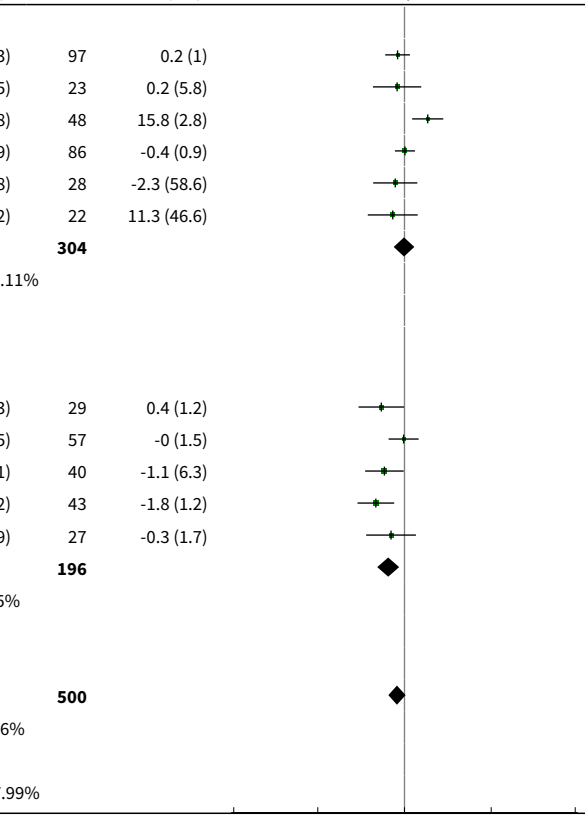
Outcome or subgroup title	No. of studies	No. of partici-pants	Statistical method	Effect size
2.2 single gender groups	5	407	Std. Mean Difference (IV, Random, 95% CI)	-0.38 [-0.63, -0.12]

Analysis 5.1. Comparison 5 Multi-session psychosocial intervention versus Standard education (subgroup analysis by gender), Outcome 1 Injection and Sexual risk behaviour (combined).

Study or subgroup	Psychoe-ducation n/N	Standard education n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
5.1.1 mixed gender groups					
COLON1993	101/483	62/547		3.78%	1.84[1.38,2.47]
DEREN1995	152/267	185/304		8.06%	0.94[0.81,1.07]
KOTRANSKI1998	196/233	160/184		10.32%	0.97[0.89,1.05]
MARGOLIN2003	25/45	15/45		1.69%	1.67[1.02,2.72]
NADR: Site 1	174/229	216/300		9.48%	1.06[0.95,1.17]
NADR: Site 10	26/44	19/50		2.09%	1.56[1.01,2.39]
NADR: Site 14	28/65	30/72		2.45%	1.03[0.7,1.53]
NADR: Site 16	155/209	77/118		7.45%	1.14[0.97,1.33]
NADR: Site 19	140/216	66/99		6.87%	0.97[0.82,1.15]
NADR: Site 20	112/138	80/110		7.98%	1.12[0.97,1.28]
NADR: Site 4	174/259	177/281		8.61%	1.07[0.94,1.21]
ROBLES2004	140/148	148/168		10.71%	1.07[1,1.15]
SIEGAL1995	108/149	152/232		8.13%	1.11[0.97,1.27]
Subtotal (95% CI)	**2485**	**2510**		**87.61%**	**1.09[1.01,1.16]**
Total events: 1531 (Psychoeducation), 1387 (Standard education)					
Heterogeneity: Tau^2=0.01; Chi^2=33.93, df=12(P=0); I^2=64.64%					
Test for overall effect: Z=2.37(P=0.02)					
5.1.2 single gender groups					
EL-BASSEL 1995	34/67	32/78		2.83%	1.24[0.87,1.77]
ELDRIDGE1997	18/51	9/48		0.9%	1.88[0.94,3.78]
MALOW1994	52/76	40/76		4.34%	1.3[1,1.69]
WECHSBERG2004	80/186	61/186		4.31%	1.31[1.01,1.71]
Subtotal (95% CI)	**380**	**388**		**12.39%**	**1.32[1.12,1.55]**
Total events: 184 (Psychoeducation), 142 (Standard education)					
Heterogeneity: Tau^2=0; Chi^2=1.16, df=3(P=0.76); I^2=0%					
Test for overall effect: Z=3.36(P=0)					
Total (95% CI)	**2865**	**2898**		**100%**	**1.12[1.04,1.2]**
Total events: 1715 (Psychoeducation), 1529 (Standard education)					
Heterogeneity: Tau^2=0.01; Chi^2=44.47, df=16(P=0); I^2=64.02%					
Test for overall effect: Z=3.16(P=0)					
Test for subgroup differences: Not applicable					

Analysis 5.2. Comparison 5 Multi-session psychosocial intervention versus Standard education (subgroup analysis by gender), Outcome 2 Injection and sexual risk behaviour (combined).

Study or subgroup	Psychoeducation N	Psychoeducation Mean(SD)	Standard education N	Standard education Mean(SD)	Std. Mean Difference Random, 95% CI	Weight	Std. Mean Difference Random, 95% CI
5.2.1 mixed gender groups							
AVANTS2004	93	0.1 (0.3)	97	0.2 (1)		11.91%	-0.16[-0.44,0.13]
BAKER1993	27	-0.8 (5.5)	23	0.2 (5.8)		7.05%	-0.17[-0.73,0.39]
BAXTER1991	86	17.3 (2.8)	48	15.8 (2.8)		10.42%	0.54[0.18,0.9]
DUSHAY2001	453	-0.4 (0.9)	86	-0.4 (0.9)		13%	0.01[-0.22,0.24]
SORENSEN1994: Detox	32	-16.4 (70.8)	28	-2.3 (58.6)		7.77%	-0.21[-0.72,0.3]
SORENSEN1994: MMT	25	-5.5 (71.2)	22	11.3 (46.6)		6.8%	-0.27[-0.85,0.31]
Subtotal ***	**716**		**304**			**56.95%**	**-0.01[-0.25,0.23]**
Heterogeneity: Tau^2=0.05; Chi^2=11.66, df=5(P=0.04); I^2=57.11%							
Test for overall effect: Z=0.09(P=0.93)							
5.2.2 single gender groups							
ELDRIDGE1997	29	-0.3 (1.3)	29	0.4 (1.2)		7.53%	-0.53[-1.06,-0.01]
HARRIS1998	73	-0 (1.5)	57	-0 (1.5)		10.67%	-0.02[-0.37,0.33]
ONEILL1996	40	-4 (6.1)	40	-1.1 (6.3)		8.83%	-0.46[-0.91,-0.02]
SCHILLING1991	48	-2.6 (1.2)	43	-1.8 (1.2)		9.21%	-0.66[-1.08,-0.24]
STERK2003	21	-2.6 (10.9)	27	-0.3 (1.7)		6.83%	-0.31[-0.88,0.26]
Subtotal ***	**211**		**196**			**43.05%**	**-0.38[-0.63,-0.12]**
Heterogeneity: Tau^2=0.03; Chi^2=6.3, df=4(P=0.18); I^2=36.55%							
Test for overall effect: Z=2.91(P=0)							
Total ***	**927**		**500**			**100%**	**-0.17[-0.37,0.03]**
Heterogeneity: Tau^2=0.07; Chi^2=26.29, df=10(P=0); I^2=61.96%							
Test for overall effect: Z=1.71(P=0.09)							
Test for subgroup differences: Chi^2=8.33, df=1 (P=0), I^2=87.99%							



Comparison 6. Multi-session psychosocial intervention vs Standard education (sub-group analysis on HIV testing)

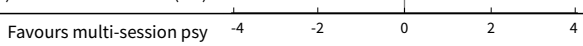
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Injection and Sexual risk behaviour (combined)	9	3428	Risk Ratio (M-H, Random, 95% CI)	1.18 [1.04, 1.34]
1.1 Reported HIV testing	6	2615	Risk Ratio (M-H, Random, 95% CI)	1.20 [1.02, 1.42]
1.2 Not reported HIV testing	3	813	Risk Ratio (M-H, Random, 95% CI)	1.20 [0.87, 1.65]
2 Injection and sexual risk behaviour (combined)	11	1427	Std. Mean Difference (IV, Random, 95% CI)	-0.17 [-0.37, 0.03]
2.1 received HIV testing	2	106	Std. Mean Difference (IV, Random, 95% CI)	-0.43 [-0.82, -0.05]
2.2 HIV testing not reported	9	1321	Std. Mean Difference (IV, Random, 95% CI)	-0.13 [-0.35, 0.09]

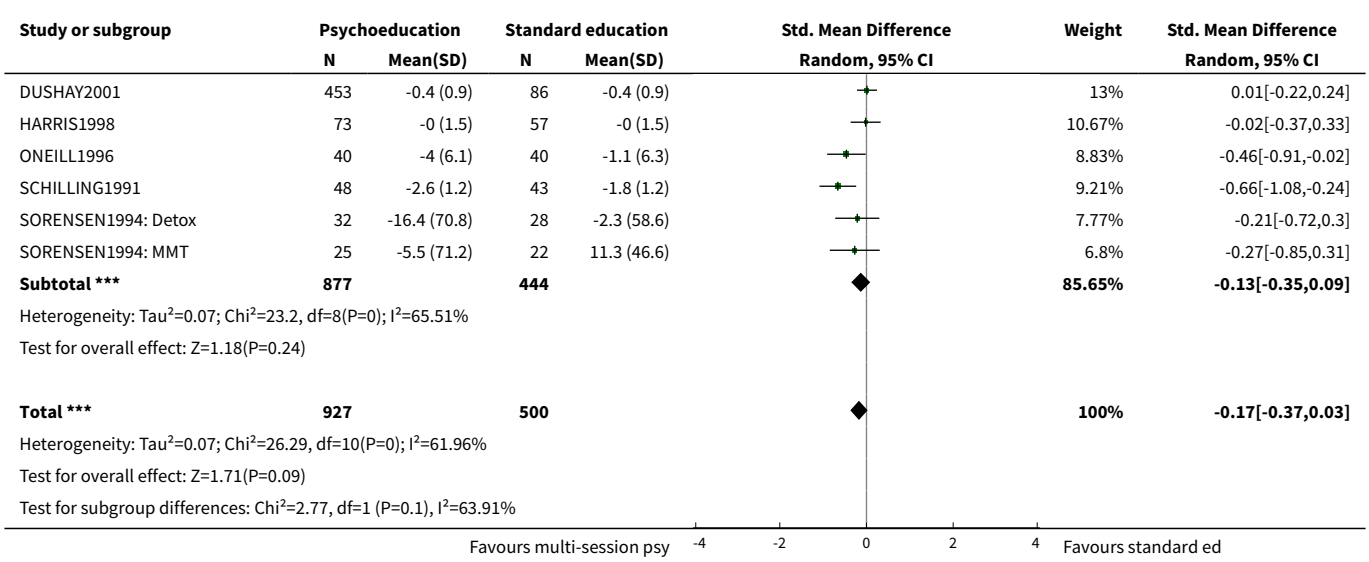
Analysis 6.1. Comparison 6 Multi-session psychosocial intervention vs Standard education (sub-group analysis on HIV testing), Outcome 1 Injection and Sexual risk behaviour (combined).

Study or subgroup	Psychoe-ducation n/N	Standard education n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
6.1.1 Reported HIV testing					
COLON1993	101/483	62/547		9.15%	1.84[1.38,2.47]
ELDRIDGE1997	18/51	9/48		2.78%	1.88[0.94,3.78]
KOTRANSKI1998	196/233	160/184		16.66%	0.97[0.89,1.05]
ROBLES2004	140/148	148/168		16.95%	1.07[1,1.15]
SIEGAL1995	108/149	152/232		14.77%	1.11[0.97,1.27]
WECHSBERG2004	80/186	61/186		10.03%	1.31[1.01,1.71]
Subtotal (95% CI)	**1250**	**1365**		**70.35%**	**1.2[1.02,1.42]**
Total events: 643 (Psychoeducation), 592 (Standard education)					
Heterogeneity: Tau^2=0.03; Chi^2=39.62, df=5(P<0.0001); I^2=87.38%					
Test for overall effect: Z=2.16(P=0.03)					
6.1.2 Not reported HIV testing					
DEREN1995	152/267	185/304		14.7%	0.94[0.81,1.07]
MALOW1994	52/76	40/76		10.09%	1.3[1,1.69]
MARGOLIN2003	25/45	15/45		4.86%	1.67[1.02,2.72]
Subtotal (95% CI)	**388**	**425**		**29.65%**	**1.2[0.87,1.65]**
Total events: 229 (Psychoeducation), 240 (Standard education)					
Heterogeneity: Tau^2=0.06; Chi^2=8.65, df=2(P=0.01); I^2=76.89%					
Test for overall effect: Z=1.08(P=0.28)					
Total (95% CI)	**1638**	**1790**		**100%**	**1.18[1.04,1.34]**
Total events: 872 (Psychoeducation), 832 (Standard education)					
Heterogeneity: Tau^2=0.02; Chi^2=42.35, df=8(P<0.0001); I^2=81.11%					
Test for overall effect: Z=2.54(P=0.01)					
Test for subgroup differences: Not applicable					

Analysis 6.2. Comparison 6 Multi-session psychosocial intervention vs Standard education (sub-group analysis on HIV testing), Outcome 2 Injection and sexual risk behaviour (combined).

Study or subgroup	Psychoeducation N	Mean(SD)	Standard education N	Mean(SD)	Std. Mean Difference Random, 95% CI	Weight	Std. Mean Difference Random, 95% CI
6.2.1 received HIV testing							
ELDRIDGE1997	29	-0.3 (1.3)	29	0.4 (1.2)		7.53%	-0.53[-1.06,-0.01]
STERK2003	21	-2.6 (10.9)	27	-0.3 (1.7)		6.83%	-0.31[-0.88,0.26]
Subtotal ***	**50**		**56**			**14.35%**	**-0.43[-0.82,-0.05]**
Heterogeneity: Tau^2=0; Chi^2=0.32, df=1(P=0.57); I^2=0%							
Test for overall effect: Z=2.19(P=0.03)							
6.2.2 HIV testing not reported							
AVANTS2004	93	0.1 (0.3)	97	0.2 (1)		11.91%	-0.16[-0.44,0.13]
BAKER1993	27	-0.8 (5.5)	23	0.2 (5.8)		7.05%	-0.17[-0.73,0.39]
BAXTER1991	86	17.3 (2.8)	48	15.8 (2.8)		10.42%	0.54[0.18,0.9]

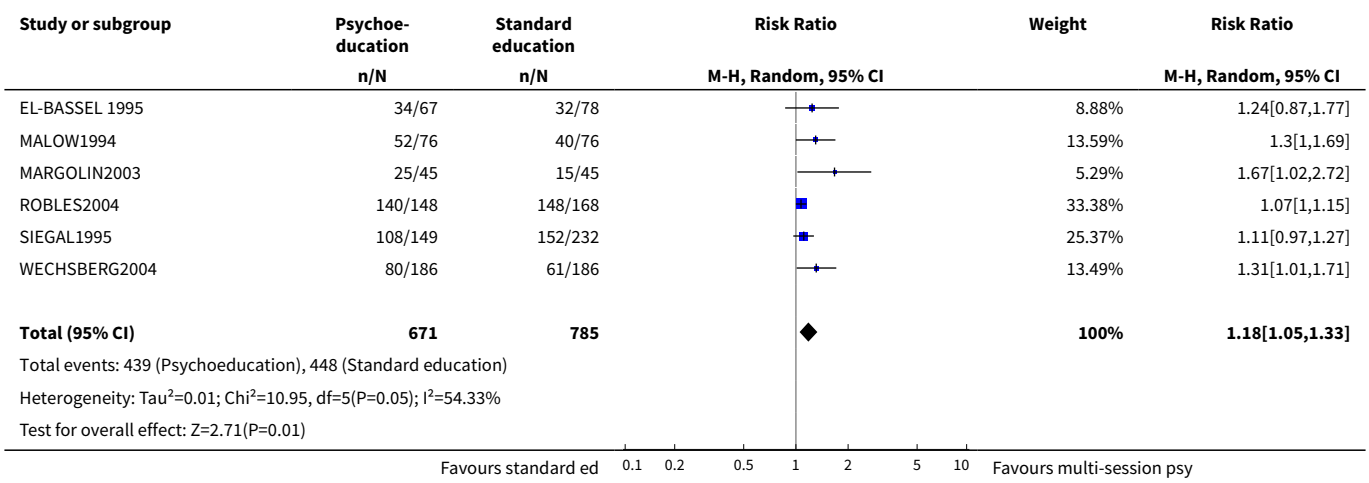




Comparison 7. Multi-session psychosocial intervention vs Standard education (sensitivity analysis: study quality)

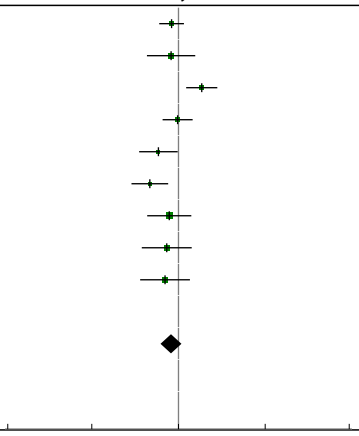
Outcome or subgroup title	No. of studies	No. of partici-pants	Statistical method	Effect size
1 Injection and Sexual risk behaviour (com-bined)	6	1456	Risk Ratio (M-H, Random, 95% CI)	1.18 [1.05, 1.33]
2 Injection and sexual risk behaviour (com-bined)	9	830	Std. Mean Difference (IV, Random, 95% CI)	-0.17 [-0.41, 0.07]

Analysis 7.1. Comparison 7 Multi-session psychosocial intervention vs Standard education (sensitivity analysis: study quality), Outcome 1 Injection and Sexual risk behaviour (combined).



Analysis 7.2. Comparison 7 Multi-session psychosocial intervention vs Standard education (sensitivity analysis: study quality), Outcome 2 Injection and sexual risk behaviour (combined).

Study or subgroup	Psychoeducation		Standard education		Std. Mean Difference	Weight	Std. Mean Difference
	N	Mean(SD)	N	Mean(SD)	Random, 95% CI		Random, 95% CI
AVANTS2004	93	0.1 (0.3)	97	0.2 (1)		14.36%	-0.16[-0.44,0.13]
BAKER1993	27	-0.8 (5.5)	23	0.2 (5.8)		9.18%	-0.17[-0.73,0.39]
BAXTER1991	86	17.3 (2.8)	48	15.8 (2.8)		12.85%	0.54[0.18,0.9]
HARRIS1998	73	-0 (1.5)	57	-0 (1.5)		13.1%	-0.02[-0.37,0.33]
ONEILL1996	40	-4 (6.1)	40	-1.1 (6.3)		11.16%	-0.46[-0.91,-0.02]
SCHILLING1991	48	-2.6 (1.2)	43	-1.8 (1.2)		11.57%	-0.66[-1.08,-0.24]
SORENSEN1994: Detox	32	-16.4 (70.8)	28	-2.3 (58.6)		9.99%	-0.21[-0.72,0.3]
SORENSEN1994: MMT	25	-5.5 (71.2)	22	11.3 (46.6)		8.88%	-0.27[-0.85,0.31]
STERK2003	21	-2.6 (10.9)	27	-0.3 (1.7)		8.91%	-0.31[-0.88,0.26]
Total ***	**445**		**385**			**100%**	**-0.17[-0.41,0.07]**
Heterogeneity: Tau^2=0.08; Chi^2=22.59, df=8(P=0); I^2=64.59%							
Test for overall effect: Z=1.41(P=0.16)							



HISTORY

Protocol first published: Issue 2, 2008
Review first published: Issue 1, 2010

Date	Event	Description
26 February 2009	Amended	Converted to new review format.

CONTRIBUTIONS OF AUTHORS

NM: contributed to design of review, assessed studies for inclusion, quality appraisal of studies, extracted data and conducted analysis, wrote first draft

RL: contributed to design of review, assessed studies for inclusion, quality appraisal of studies, extracted data, commented on draft

DDJ: contributed to design of review, added additional content to the draft and commented on analysis

SP: contributed to design of review, resolved differences in interpretation between NM and RL in applying the inclusion criteria, commented on draft

DECLARATIONS OF INTEREST

None known

SOURCES OF SUPPORT

Internal sources

- National Institute of Health and Clinical Excellence, UK.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Drug Users; *Risk Reduction Behavior; HIV Infections [*prevention & control] [transmission]; Psychotherapy [*methods]; Randomized Controlled Trials as Topic; Risk-Taking; Substance Abuse, Intravenous [*prevention & control] [psychology]; Unsafe Sex [*prevention & control]

MeSH check words

Humans