

Evidence Check

Alcohol and other drugs prevention in vulnerable young people

An **Evidence Check** rapid review brokered by the Sax Institute
for the NSW Ministry of Health. February 2018

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This report was prepared by:

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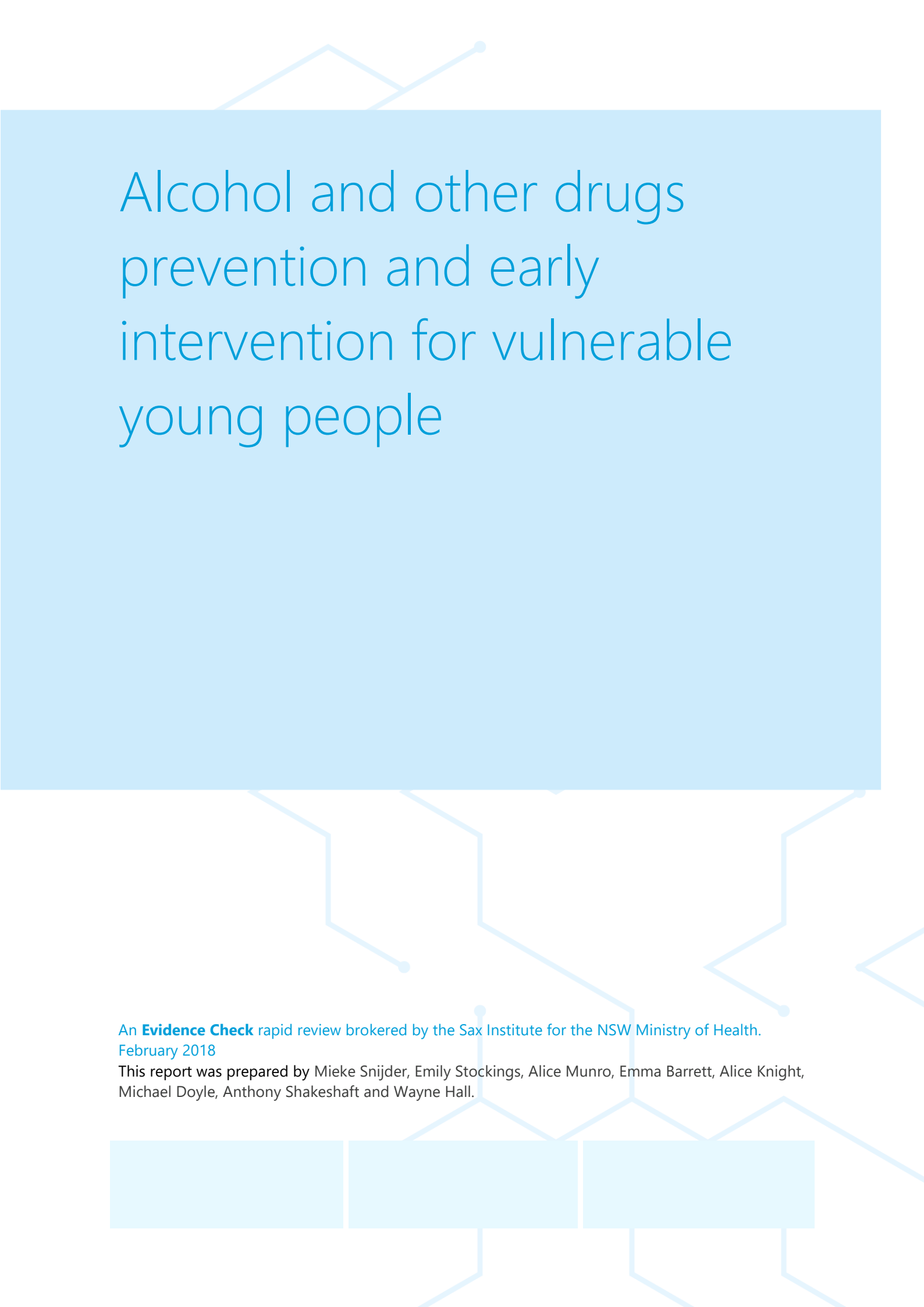
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This **Evidence Check Review** was produced using the Evidence Check methodology in response to specific questions from the commissioning agency.

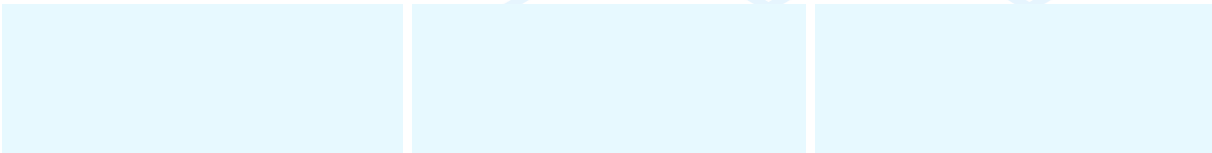
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Glossary

APO	Analysis and Policy Observatory
AUDIT	Alcohol Use Disorders Identification Test
BI	Brief Intervention
CRAFFT	Substance use screening tool (acronym: Car, Relax, Alone, Forget, Friends Trouble)
CTC	Communities that Care
CMCA	Communities Mobilizing for Change in Alcohol
ED	Emergency Department
GP	General Practitioner
KiR	Keepin' it REAL (curriculum-based substance use prevention program)
NREPP	National Registry of Evidence-based Programs and Practices
P.A.R.T.Y.	Prevent Alcohol and Risk-related Trauma in Youth (WA injury awareness program)
RCT	Randomised Controlled Trial
SBI	Screening and Brief Intervention
SBIRT	Screening Brief Intervention and Referral to Treatment
SFP	Strengthening Families Program
VCU	Virginia Commonwealth University

Executive summary

Background

This Evidence Check was commissioned by the NSW Ministry of Health and NSW Police to summarise the evidence to inform the development of substance use prevention and early intervention program/s for vulnerable young people defined as disadvantaged adolescents at risk of substance-related harms aged 12–17 years old. The aim of these programs was to prevent and delay initiation and/or reduce harms associated with substance use.

Review questions

This review aimed to address the following questions:

Question 1: For vulnerable young people aged 12–17 years old:

- What prevention interventions/programs have been shown to be effective in preventing and/or delaying AOD use?
- What early interventions/programs delivered have been shown to be effective in reducing AOD use and related harms?

Question 2: Of the interventions identified in response to Question 1, what are:

- The critical components of the intervention/ program?
- Key participant characteristics as described by study authors that contributed to the interventions' effectiveness?

Summary of methods

Seven peer reviewed and eight grey literature databases were searched for studies evaluating prevention and early intervention programs for vulnerable young people aiming to reduce alcohol and other drug use and related harms. Studies from Australia, Canada, the United States, United Kingdom and New Zealand were included if they were published between January 2007 and October 2017.

Quality of the evidence was assessed using the NHMRC levels of evidence, which ranks studies on six levels: level I, systematic reviews of randomised controlled trials (RCTs); level II, RCTs; level III-1, pseudo-RCTs; level III-2, comparative studies with concurrent controls; level III-3, comparative study without concurrent controls; and level IV, case series with either post-test or pre-test/post-test outcomes. The evidence base was summarised on the quality, consistency, clinical impact, generalisability and applicability of the evidence.

Key findings

The review team identified 24 publications, describing 23 evaluations for inclusion in this rapid review. Two studies were systematic reviews of RCTs: one assessed mentoring programs and one assessed screening, brief intervention and referral to treatment (SBIRT). Nine studies were RCTs: one investigated an in-service advocacy program; one a school, community and a combined community and school-based intervention; two evaluated personality-targeted interventions; three evaluated family-based interventions; and, two investigated screening and brief intervention. Four studies were comparative with concurrent controls of that investigated a computerised screening and brief intervention program, one assessed an in-service health promotion program, one an adaptation of a school-based program to vulnerable youth settings (e.g. juvenile justice day program, homeless shelter) and one a youth development program. Four included

studies were comparative studies without controls. Three assessed screening and brief intervention and one assessed a community-based prevention program. Finally, four studies were case series: one evaluated an in-service health promotion program, one evaluated three juvenile drug courts, one evaluated a community-based prevention program and one evaluated a school-based prevention program.

Question 1: What prevention and early interventions/programs have been shown to be effective in preventing and/or delaying AOD use?

Prevention programs

This rapid review identified various promising prevention approaches for substance use amongst vulnerable youth, including: mentoring, personality-targeted programs, family-based programs, community-based programs, screening and brief intervention, and a school-based program adaptation. Mentoring and brief intervention programs were supported by evidence from literature reviews of RCTs (Level I) and one or more RCTs (Level II). Family-based programs and personality-targeted programs were shown to be effective in two or more RCTs (Level II). Community-based programs showed promising effectiveness in one RCT (Level II), one longitudinal study (Level III-3) and one case series (Level IV). An adaptation of a school-based program showed to be a promising approach in a comparative study with controls (Level III-2) to adapt evidence-based school interventions to vulnerable youth settings. However, overall more evidence is required from multiple rigorous studies to more confidently assess whether each program is an effective prevention approach for vulnerable youth.

Early interventions

This rapid review identified various promising early intervention programs that reduced substance use among vulnerable youth. These included: mentoring, SBIRT, family-based interventions, and in-service advocacy and health promotion programs. While some of these approaches (especially mentoring, SBIRT and family-based interventions) are supported by evidence from literature reviews of RCTs (Level I) or by one or more RCTs (Level II), overall more evidence is required from multiple rigorous studies to more confidently support each program as an early intervention approach to reduce substance use among vulnerable youth.

Question 2: What are the critical components and the participant characteristics of the identified prevention and early interventions

Participants

The effective prevention and early intervention programs targeted participants aged 11–19 years old. Participants consisted of homeless youth, youth from minority groups with behavioural problems, youth attending services, juvenile offenders and Indigenous youth. A total of four studies identified vulnerable youth according to their own definition. These studies used screening questionnaires to identify which youth were vulnerable and should receive the intervention.

Critical components

Various critical components of effective interventions were identified, including the use of computers in screening and brief intervention (SBI), offering multiple sessions, providing skills training and development opportunities, and involving parents in the intervention. Other less critical components included providing recreational activities and health education and linking in with other services.

Recommendations

While more evidence from multiple rigorous studies is required to confirm the evidence for prevention and early intervention programs for vulnerable young people, the authors of this review suggest that NSW Ministry of Health and NSW Police could consider implementing the following programs in NSW:

- Personality-targeted prevention programs show promise in reducing alcohol and other drug use and have been trialled in Australia.
- Mentoring programs are widely implemented, low cost and have shown to reduce substance use and delinquency, both as prevention and early intervention programs.
- While more research is required for SBIRT for use with adolescents, it is likely to be an effective approach. There is promise in the delivery via tablet/computer or computerised delivery by therapist, or other worker in a juvenile justice setting if officers receive training.
- Family-based interventions might be recommended, but more evidence is needed for local Australian family-based intervention that are responsive to the local cultural context.
- Evidence-based school-based programs can be adapted to vulnerable youth settings in close collaboration with youth in these settings.
- Finally, it is likely that a multi-component approach which combines several of these strategies are most effective given the regular co-occurrence of multiple risk factors within vulnerable youth.

Furthermore, the authors strongly encourage NSW Ministry of Health and NSW Police to help build the evidence-base for prevention and early intervention programs by supporting more rigorous evaluations of these programs. The following processes can be implemented to support rigorous evaluations:

- When adapting programs to the local context, ensure community participation in every step of the adaptation process to ensure that the adaptation is truly relatable to the new setting.
- Developing a consistent, adolescent-specific data collection systems that can be accessed by multiple agencies to develop coordinated, targeted and timely responses to risk behaviour. This will assist in providing much needed information about the risk and protective factors for vulnerable young people that can inform the development and tailoring of interventions.
- To ensure generalisability and comparability across different settings, an overarching standardised intervention model could be developed that operationalises each effective intervention in a standardised way while simultaneously tailoring the activities that operationalise each component to the resources and needs of communities ¹
- Implementing the following six key actions:
 1. Strong, cross-agency collaboration and governance of prevention and intervention activities for vulnerable young people
 2. Improving the availability of data on risk factors in young people through development of adolescent specific data collection systems
 3. Using these data to more precisely define the risks experienced by vulnerable young people
 4. Taking a comprehensive, multi-component approach to prevention and intervention of risk behaviours in vulnerable young people
 5. Achieving greater consistency and comparability across interventions by reaching cross-agency agreement on a standardised definition for intervention and prevention activities
 6. Standardising the outcomes and the outcome measures used to evaluate intervention effects.

Background

Adolescence is a challenging time for many young people as they are faced with changes in school, their physical appearance, their interests and friends, and their responsibilities as a person in society. While the majority of young people emerge into young adulthood without too many issues, some youth display high risk behaviours during this period and are more vulnerable to developing ongoing problems as a result. Substance use related issues are a particular concern amongst vulnerable youth as early onset of substance use has been associated with later substance use and mental health disorders, lower academic achievement and unemployment. Providing prevention and early intervention opportunities for vulnerable youth has therefore been identified as a priority by the NSW Ministry of Health and NSW Police.

The Ministry of Health and NSW Police are working to develop and implement programs for vulnerable young people to prevent and minimise the risk of harm from substance use. The Ministry of Health is responsible for developing population-based substance use prevention and early intervention programs. Drug and Alcohol Coordination in the NSW Police is responsible for identifying and developing effective strategies to reduce drug-related crime and recidivism amongst offender populations, and is particularly interested in investigating opportunities to enhance the effectiveness of existing diversionary options for young offenders.

A review of the evidence was commissioned to inform the development of substance use prevention and early intervention program(s) for vulnerable young people defined as disadvantaged adolescents at risk of substance-related harms aged 12–17 years old. The aim of these programs was to prevent and delay initiation and/or reduce harms associated with substance use.

The Evidence Check questions were:

Question 1: For vulnerable young people aged 12–17 years old:

- What prevention interventions/programs have been shown to be effective in preventing and/or delaying AOD use?
- What early interventions/programs delivered have been shown to be effective in reducing AOD use and related harms?

Question 2: Of the interventions identified in response to Question 1, what are:

- The critical components of the intervention/ program?
- Key participant characteristics as described by study authors that contributed to the interventions' effectiveness?

Methods

This review searched both the peer-reviewed literature and grey literature for studies evaluating drug and alcohol prevention and early intervention programs for vulnerable young people.

Databases included

Peer reviewed databases searched were: Cochrane, Embase, PsycInfo, Medline, CINAHL, Scopus and Global Health. Grey literature databases searched were: Campbell, SAMHSA's National Registry of Evidence-based Programs and Practices (NREPP); Analysis and Policy Observatory (APO); CrimeSolutions; Virginia Commonwealth University (VCU) Libraries Research Guides; and, grey literature databases, research trial registry and Google.

Search strategy

Peer reviewed databases were searched using search terms relevant to the participant group (vulnerable young people), intervention and setting, evaluation studies and outcomes related to drugs and alcohol, and delinquency. Search terms were based on previous published literature reviews on similar topics ¹⁻³, supplemented by subject headings in each database and finalised in discussion with the commissioning agency. Search terms were as follows:

1. Teen*, "Young people" OR Adolescen* OR Youth OR Child OR Minor OR Juvenile
2. Aboriginal OR Torres Strait Islander OR Indigenous OR Maori OR First Nation OR Inuit OR Indians OR Native OR Vulnerable populations OR Underserved OR Disadvantaged OR Emigrants and immigrants OR Foreigners OR Refug* OR Homeless youth OR Sexual Minorities OR Bisexuals OR GLBT persons OR GLBTQ persons OR Gays OR Gender minorities OR Homosex* OR Lesbi* OR Queer OR Crime victims OR Drug users OR Drug abusers OR Drug addicts OR Risk factors OR Trauma and stressor related Disorders OR Trauma OR Substance-related disorders OR Disabled persons OR Rural Population OR Remote OR Offender OR crime OR Possession OR Delinquen*
3. 1 AND 2
4. Prevent* OR Interven* OR Primary prevention OR Secondary prevention OR "early intervention" OR "brief intervention" OR "Cognitive therapy" OR Cognitive Behavioral therapy OR Family OR emotional regulation impulse control OR Mentor* OR Educat* OR Program OR Diversion OR Counselling OR Support OR "Referral and consultation" OR Harm reduction OR Harm minimisation OR Computer OR App OR Online OR Ehealth OR Mhealth OR Internet OR Mobile Applications OR Telehealth OR SBIRT OR Motivational interviewing
5. Service OR Justice OR Correctional OR Police OR Criminal OR Court OR Community OR Centre OR Care
6. 4 AND 5
7. randomized controlled trial OR controlled clinical trial OR clinical trials as topic OR multicenter study OR random* OR trial OR (pretest or pre test) OR (posttest or post test) OR before after OR nonrandomi* OR interrupted time series analysis OR interrupted time series OR multiple baseline OR regression discontinuity OR Systematic review OR Evaluation study as topic OR Evaluat* OR Effect* OR Outcome Measure OR Program indicator OR Impact OR Outcome Assessment
8. substance OR drug OR alcohol OR petrol OR cannabis OR kava OR methamphetamine OR MDMA OR inhalant OR marijuana OR amphetamine OR "psycho stimulant" OR "illicit drug" OR "volatile drug" OR Polydrug OR Heroin OR Opioids OR Opiates OR Methadone OR Stimulants OR Hallucinogens OR Street drugs OR Designer drugs OR Pharmaceutical drug misuse OR polysubstance OR Cocaine OR Ice OR "new psychoactive substances"
9. Reduc* OR Dela OR Ceas* OR Disorder OR Abuse OR Misuse OR Stop* OR Recidiv* OR reoffend*
10. 8 AND 9
11. Canada OR Australia OR New Zealand OR United States OR United Kingdom
12. 3 AND 6 AND 7 AND 10 AND 11

Searches were limited to English language and human studies published from January 2007 to October 2017.

Search terms in grey literature databases were restricted due to less advanced search options but are set out below. Campbell, in the review and crime and justice section; Substance prevention; prevention; alcohol; drugs. NREPP, prevention restricted to ages 13–17 years old (adolescents). APO, in the justice section, restricted to research reports “youth substance prevention”. Crimesolutions in the prevention and education subsection of drugs and substance use. VCU, in the drug and alcohol resources “youth prevention”. Trial registry, prevention. Google, substance prevention high risk youth.

Eligibility criteria

Studies were included if they met the following inclusion criteria:

- Evaluation study
- Published between 2007 and 2017
- Programs based in US, Canada, New Zealand, United Kingdom or Australia
- Targeted vulnerable youth 12–17 years old or older if their findings were relevant to this age group
- Substance related outcomes or recidivism and reoffending related outcomes.

Studies were excluded if they were any of the following:

- Programs delivered within school curriculum or education service that are not transferable to other settings¹
- Interventions that are solely treatment focused
- Rehabilitation services
- Interventions for tobacco/smoking
- Programs exclusively targeted at addressing employment, education, recreation or religious programs
- Media based interventions
- Not focused on vulnerable young people (See list of definitions of vulnerable people in Appendix A).

Procedure and quality assessment

Study selection

The review team searched databases following the search strategy outlined above. Titles and abstracts were uploaded in Covidence⁴ and MS screened them for eligibility by using the above criteria. Eligible studies were downloaded into an EndNote reference database AK, AM, ES, EB and MS screened full-text articles and included those that they met the above eligibility criteria.

Data extraction

The same authors extracted data regarding the aims, participants, design, procedures and outcomes of the eligible studies and summarised it in an outcome table that was developed with the approval of the commissioning agency.

Quality assessment

Each study received a level of evidence rating according to the NHMRC level of evidence (Table 1), which ranks studies from Level I (systematic review of randomised controlled trials) to Level IV (case series with post-test or pre/post-test outcomes).

¹ Programs that were delivered and evaluated in schools, but that can be transferred to other settings were included.

Table 1 NHMRC level of evidence

Level of Evidence	Study Design
I	A systematic review of Level II studies.
II	A randomised controlled trial.
III-1	A pseudo-randomised controlled trial (i.e. alternate allocation or some other method).
III-2	A comparative study with concurrent controls (i.e. non-randomised experimental trials, cohort studies, case-control studies and interrupted time series studies with a control group).
III-3	A comparative study without concurrent controls (i.e. historical control study, two or more single arm studies and interrupted time series studies without a parallel control group).
IV	Case series with either post-test or pre-test/post-test outcomes.

The individual study ratings were used to summarise the evidence base of prevention and early intervention of substance use for vulnerable young people using the NHMRC matrix displayed in Table 2.

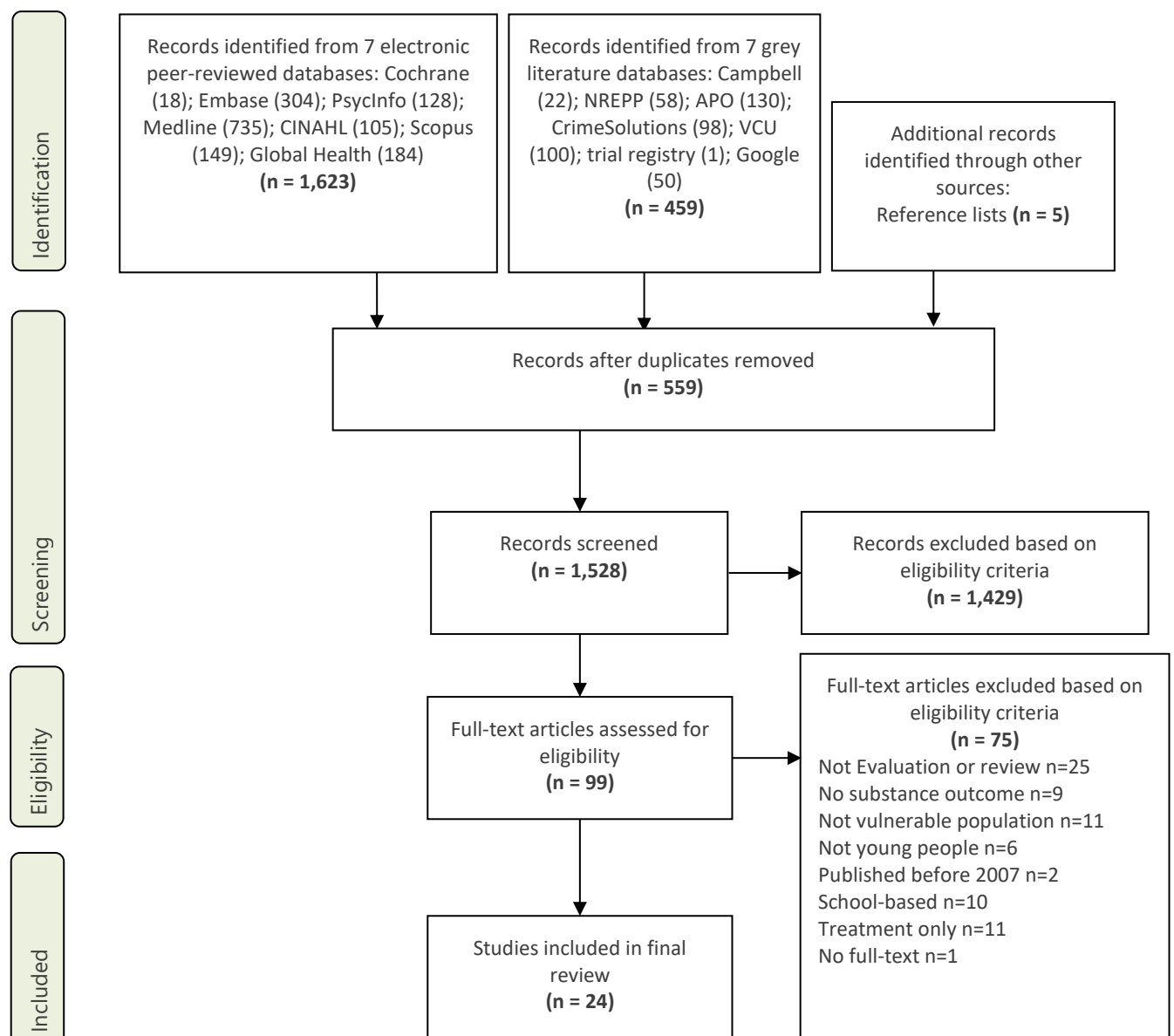
Table 2 NHMRC matrix to summarise the evidence base

Component	A	B	C	D
	Excellent	Good	Satisfactory	Poor
Evidence base (using hierarchy table above)	several level I or II studies with low risk of bias	one or two level II studies with low risk of bias or a systematic review or multiple level III studies with low risk of bias	level III studies with low risk of bias, or level I or II studies with moderate risk of bias	level IV studies, or level I to III studies with high risk of bias
Consistency	all studies consistent	most studies consistent and inconsistency may be explained	some inconsistency reflecting genuine uncertainty around clinical question	evidence is inconsistent
Clinical impact	very large	substantial	moderate	slight or restricted
Generalisability	population/s studied in body of evidence are the same as the target population in question	population/s studied in the body of evidence are similar to the target population in question	population/s studied in body of evidence differ to target population in question but it is clinically sensible to apply this evidence to target population	population/s studied in body of evidence differ to target population and hard to judge whether it is sensible to generalise to target population
Applicability	directly applicable to Australian context	applicable to Australian context with few caveats	probably applicable to Australian context with some caveats	not applicable to Australian context

Results

In total, 1,623 studies were identified in the peer-reviewed databases, 459 in grey literature databases and an additional 5 studies through reference lists of included studies. After removing 559 duplicates, 1,528 titles and abstracts were screened. Of those, 99 met the eligibility criteria and were assessed for inclusion in the review. After full-text eligibility assessment, 24 publications describing 23 evaluations met the inclusion criteria and were included in the final review. Figure 1 summarises this search process and outlines reasons for exclusion.

Figure 1 Results of literature searches



Of the 23 included evaluations, 16 were conducted in the US, 2 in the UK, 3 in Australia and 2 in multiple countries (US and other countries). The Table in Appendix B lists all included studies organised by their NHMRC level of evidence, objectives, sample size and setting, design, intervention/methods and findings. The results discuss findings of each of the included studies for each of the NHMRC levels of evidence.

Reviews of randomised controlled trials (level I)

This rapid review identified two (9%) systematic reviews of randomised controlled trials^{5, 6} carried the highest level of evidence according to the NHMRC evidence rating. Table 3 outlines the objective, sample description, methods, intervention and findings for these systematic reviews. This section will detail the findings of each systematic review.

Screening and brief intervention and referral to treatment

Mitchell et al reviewed the literature on Screening Brief Intervention and Referral for Treatment (SBIRT) as an early intervention strategy used with adolescents aged 14–17 years old. SBIRT is used to identify alcohol and other drug use amongst adolescents before they develop substance-related disorders. The SBIRT review found 15 RCTs in the UK and the US up until 2011: 6 in emergency department (ED) setting, 6 in a school setting, 1 in primary care setting and 2 in a community setting (i.e. one with youths who reported using cocaine or ecstasy and one with homeless youth). The screening element of the SBIRT in the RCTs was conducted with participants in the study setting to identify participants at risk of substance related disorders. Screening was conducted with standardised measures. The CRRAFT (or Car, Relax, Alone, Forget, Friends Trouble) and the AUDIT (Alcohol Use Disorders Identification Test) measures were found to most reliable and appropriate for use in screening with adolescents because they were specifically developed for use with them and are brief to administer. The Brief Intervention (BI) component of the studies used a variety of strategies and lasted between 10 and 60 minutes. In settings where the SBIRT was not the main reason for the interaction it was important for the BI to be brief. The BI was delivered by dedicated mental health workers, peer workers, health educators or via online tools in three studies. There was not sufficient evidence that BI delivered online was better or worse than BI delivered in person. Motivational interviewing was used in the delivery of all BI. The practitioner providing the BI engages in a change talk with the participants, which involves assisting the participant to explore the cost and benefits of their substance use and alternatives to it. It focuses on getting the participant ready to change their behaviours. Four studies found evidence for reduction in alcohol use (and binge drinking) following SBIRT. Two studies found reductions in marijuana use among SBIRT participants compared to control participants, but another study found reductions in illicit drug use but not marijuana use. Two studies that involved family/parents in the SBIRT found the addition of family was more effective than SBIRT with a health provider alone. Overall, Mitchell et al (2013) concluded that the evidence around SBIRT for adolescents is underdeveloped and that more large scale RCTs are required. Furthermore, the referral to treatment (RT) element of SBIRT was not assessed in any of the 15 studies. Finally, while SBIRT has been conducted in a variety of settings as identified in this literature review, none of the SBIRTs were conducted within a police or justice setting.

Mentoring

The second systematic review of RCTs was by Tolan et al who assessed the effectiveness of mentoring interventions as an early intervention and prevention strategy for delinquency, drug use, aggression and academic achievement.⁶ Mentoring interventions generally involve an older person and a young (vulnerable) person developing a relationship in which the mentor uses their own life experience to guide the young person towards a better pathway. Mentoring is a popular approach in the US and Tolan et al identified 146 mentoring studies, of which, 46 — 27 RCTs and 19 quasi-experimental studies — met the final inclusion criteria. A meta-analysis showed that mentoring programs had positive and statistically significant outcomes on all four measures of delinquency, drug use, aggression and academic achievement, with average effect sizes. The effectiveness of the mentoring intervention increased when the mentor was motivated to become

a mentor as a means of professional development and career progression. The effect size of the mentoring intervention also increased when the mentoring program had a specific focus on emotional support and advocacy for the young mentee (along with two other core components, modelling/identification promotion and teaching). Overall, Tolan et al (2013) concluded that there is evidence that mentoring has a positive effect on social and health outcomes for youth at risk of delinquency. However, the evidence could be further strengthened when mentoring programs use a more standardised approach that maximises the features that lead to larger effect sizes (e.g. professional development as a motive for mentors and a focus on emotional support and advocacy in the mentor-mentee relationship).

Table 3: Level I studies (reviews of randomised controlled trials) included in this review (n=2)

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Mitchell, 2013, UK and US ⁵	Review the existent literature and strength of the evidence of the use of SBIRT in adolescents	Adolescents aged 14 –17 years old, studies conducted in the US and Great Britain	Systematic review of Randomised Controlled Trials	In Screening Brief Intervention and Referral to Treatment (SBIRT) adolescents are first screened using validated tools, those who are at risk of substance misuse receive a brief intervention (ranging from 15 min to more than 60 min). The BI is provided by trained professionals, peers or computerised delivery often using motivational interviewing strategies.	<p>15 RCTs of SBIRT, 1 in primary care setting, 6 ED setting, 6 in school-setting, 2 in community setting.</p> <ul style="list-style-type: none"> The primary care setting identified a reduction in marijuana use among intervention participants relative to control, but not for alcohol use. ED studies did not find reductions in binge drinking in intervention relative to controls. 1 ED study found reduction in marijuana use amongst intervention relative to controls. Mixed findings for school setting, with 2 studies finding significant reductions in self-reported substance use (one of which involved parents in the BI), the other 4 studies did not find changes in substance use in the intervention group relative to controls. 1 community-based BI RCT did not find any differences between the intervention and control group. The other community-based study with homeless youth found reduction in illicit drug use amongst intervention participants, but no reductions in marijuana or alcohol use.
Tolan, 2013, US and other countries ⁶	To systematically review the evidence on the effects of mentoring interventions for delinquency and related problems of aggression, drug use and school failure	146 studies of mentoring, 46 included in quantitative analysis. 27 RCTs and 19 quasi-experimental studies. 25 studies targeting delinquency related outcomes, 6 studies targeting drug use outcomes	Systematic review of RCTs and quasi-experimental studies	<p>Mentoring interventions involve a mentor-mentee relationship of usually an older person and a young person who build a relationship and interact of an extended period. The older person has greater share of knowledge experience and power, which they can use to support the mentee and be a positive influence.</p> <p>The authors searched scientific databases and research registers and reference lists of primary studies and reviews. Authors conducted an inverse-variance meta-analysis with a random-effects model to calculate the effect size of the impact of mentoring on the four outcomes.</p>	<p>The outcomes of the studies were statistically significant and positive for each outcome, with average effect-sizes for all four outcomes:</p> <ul style="list-style-type: none"> Delinquency $r = 0.21$ Drug use $r = 0.16$ Aggression $r = 0.29$ Academic achievement $r = 0.11$

Randomised controlled trials (Level II)

This rapid review identified nine (39%) RCTs that carried an NHMRC evidence rating level II.⁷⁻¹⁴ Table 4 summarises the objectives, sample size, research design, methods/intervention and the findings of the RCTs. One RCT evaluated an outreach and advocacy intervention⁷; one evaluated a school, community and a combined community and school-based intervention⁸; two evaluated the effectiveness of personality-targeted interventions^{9, 11}; three evaluated family-based interventions^{10, 12}, one of which combined family and school-based interventions¹³; and, two evaluated the effectiveness of Screening and Brief Intervention.^{14, 15} Of those 7 RCTs were conducted in the US^{7-10, 12-15}, 1 in the UK⁹ and 1 in Australia.¹¹

Advocacy and outreach intervention

Guo et al evaluated whether a strengths-based outreach and advocacy intervention could reduce illicit drugs other than marijuana (e.g. heroin, methadone, opiates/analgesics, cocaine, methamphetamines, hallucinogens and inhalants) amongst homeless youth aged 14–24 years old.⁷ The intervention involved an outreach worker identifying homeless youths at soup kitchens, homeless camps, libraries and parks to encourage these homeless youths to accept the next level of service at either a drop-in centre or homeless shelter. The outreach approach was based on the youths' strengths and client-driven. The outreach worker supported the homeless youth for six months and met with the participants an average of 12–17 times over this period. The homeless shelter provides temporary shelter with the aim to find housing; the drop-in centre did not provide overnight stay but linked youths with community resources to find housing and engage in counselling.

A total of 79 male homeless youths was recruited. Participants referred to the drop-in centre showed a greater reduction in the odds of using illicit drugs than participants in the homeless shelter. Guo et al concluded that drop-in centres are a low-demand setting with fewer restrictions that are preferred by homeless youths and improved substance-related outcomes more than the more restrictive homeless shelter.⁷

Community and school-based interventions

Komro et al conducted an RCT in six communities to evaluate the effectiveness of a multilevel (school and community-based) intervention as a prevention strategy for underage alcohol use among Indian and non-Indian youth living in Cherokee Nation.⁸ Communities implemented the Communities Mobilizing for Change on Alcohol (CMCA) community intervention, the CONNECT school-based intervention, both of these interventions, or they were assigned to a control condition in which they received the programs after the study. CMCA was a six-stage alcohol education program implemented by a community action team. CONNECT was a school-based screening and BI in which a social worker delivered the screening and BI to students in one-on-one health consultations every semester over a 3-year period.

Students in all intervention conditions showed reductions in alcohol use, binge drinking and alcohol-related consequences compared to the control group. Students in communities who implemented the CMCA or the CONNECT programs alone achieved greater benefits than communities that implemented a combination of the two. Komro et. al concluded that CONNECT and CMCA are effective interventions to reduce the typical adolescent trajectory of increasing alcohol use and heavy episodic use for two years, with a shrinking effect for six months afterwards.⁸ They found that these interventions were similarly effective for Native and non-Native American students.

Personality-targeted interventions

A well-researched personality-targeted intervention is the Preventure intervention originally developed by Patricia Conrod and colleagues in the UK.¹⁶ Mahu et al and Newton et al conducted RCTs of versions of this program as a prevention strategy to reduce marijuana use⁹ or alcohol use¹¹ in high risk students. The ADVENTURE (a teacher-delivered UK version) and PREVENTURE (a psychologist-delivered Australian

adaptation) programs consisted of a brief personality-targeted intervention delivered in two 90-minute group sessions by a trained facilitator (teacher or other). The programs aim to teach young people personality-specific coping skills to reduce the likelihood that they will use alcohol or other drugs. It covers psychoeducational, cognitive-behavioural and motivational interviewing strategies specified for the four high risk personality types that are associated with early-onset alcohol and drug use (anxiety sensitivity, hopelessness, impulsivity and sensation seeking). The content targets the dominant personality profile and the motivational factors linking the profile to alcohol or drug use (e.g. anxiety, avoidance, aggressive thinking). The two sessions include the development of individualised models of the physical, cognitive and behavioural components of typical personality-specific reactions, and application of cognitive-behavioural skills to modify maladaptive or problematic reactions and behaviours. While interventions were delivered within a school setting, they can be transferred to other service settings.

Mahu et al found reduced rates for cannabis use at six months follow-up and reductions in frequency of use at 12 and 18-months follow-up. The intervention was likely most effective for sensation-seeking participants, who showed a delayed onset of cannabis use and a significant reduction in probability of reporting marijuana use at six months and two years follow-up.⁹ Newton et al found that PREVENTURE participants showed significant less alcohol use, binge drinking and alcohol-related harms in the 36 months after the intervention.¹¹ Mahu et al concluded that there was no conclusive evidence of the effectiveness of the personality-targeted intervention to delay onset and reduce frequency of cannabis use for high risk youth overall but there was an effect for sensation seeking youth. Newton et al concluded that the PREVENTURE intervention was effective to reduce uptake of alcohol use among young adolescents and effective in reducing frequency and harmful use among older adolescents.

Family-based interventions

Milburn et. al, Pantin et. al and Spoth et. al conducted RCTs of family-based prevention and early intervention strategies to reduce drug and alcohol use among homeless adolescents¹⁰, Hispanic youth with behavioural problems¹² and youth at risk of substance use.¹³ The STRIVE intervention aimed to improve families' problem-solving and conflict resolution skills by using cognitive behavioural strategies. Sessions were delivered to youth and the parent(s) together by a trained facilitator.¹⁰ Familias Unidas aimed to improve the knowledge and skills of immigrant parents to raise their children in the United States. A trained facilitator supported parents to acquire these skills in 9 one-hour group sessions and to apply these skills at home in 10 one-hour home visits, including 4 one-hour booster sessions.¹² The Strengthening Families Program (SFP) aimed to enhance parenting skills in nurturing limit setting, communication and youth prosocial and peer resistance skills. A trained facilitator delivered seven one-hour sessions to parents and youth. This was followed by a one-hour family-session in which parents and youth practiced their newly learned skills.¹³ Spoth et al combined this family-based intervention with school-based interventions that the participating communities picked from a list of evidence-based interventions.

Milburn et al the STRIVE intervention significantly reduced alcohol use, sexual risk behaviours and delinquency among youth whose families participated compared to the control condition. However, there was an iatrogenic effect for cannabis; STRIVE participants showed an increase in cannabis use compared to control.¹⁰ Pantin et al found a significant reduction in substance use and increased condom use among youth whose parents participated in the Familias Unidas intervention. Familias Unidas participants also reported significant improvements in family functioning. Further analyses identified that improved family functioning was a mediating factor in the improvements in substance use and condom use.¹² Spoth et al found that, compared to control condition, general intervention participants receiving the combined family and school intervention had significantly lower substance use initiation rates, lower new-user rates of substances, and lower rates of past-year marijuana and inhalants use. For the subsample of participants at

higher risk of substance use related disorders, the intervention effect was even stronger for substance use initiation and past month cigarette use.¹³

Milburn et al concluded that STRIVE is effective in reconnecting homeless youth with their families, and in reducing alcohol and illicit drug use. Its five sessions are also shorter than most family interventions and might therefore be implemented in a variety of settings with vulnerable adolescents.¹⁰ Pantin et al concluded that improving family functioning using a parent-centred intervention was effective in reducing substance use amongst adolescents with behavioural problems.¹² Spoth et al concluded that the SFP combined with a school-based intervention was an effective model to prevent substance use among lower risk youth and reduce substance use among higher risk youth. Due to the high number of sessions of the SFP program (15 sessions) provided by trained staff, the SFP intervention comes with considerable costs including staff wages and resource costs so economic analyses should be conducted to assess whether these costs outweigh the benefits.¹³

Therapist –delivered and computerised brief intervention

Two RCTs by Walton et al evaluated a BI as a prevention and early intervention strategy to delay initiation of cannabis and alcohol use, and reduce involvement in delinquency¹⁵ and violence¹⁴. Both studies compared therapist delivered BI and computerised BI to a control condition in which participants were provided with an information flyer.

The BI focused on goals, personalised feedback on alcohol, violence and weapon carriage. It included a decisional balance exercise on the potential benefits of staying away from drinking and fighting, a role play and referral to services. The BI was based on tenets of motivational interviewing. The therapist was trained in motivational interviewing and followed the content of the BI from a screen (computer or tablet) which included the personalised feedback based on a survey completed by the participant. The computerised BI was delivered via a tablet and contained the same content as the therapist-delivered brief intervention but was completed with a buddy¹⁴ or was an interactive animated program.¹⁵ The first RCT was conducted in an ED with adolescents reporting past year aggression and alcohol use¹⁵ and the second in a primary care setting with adolescents who had not started using cannabis.¹⁴

The first RCT did not find significant differences between control and either BI group on binge drinking and alcohol misuse.¹⁵ However, participants in both BI conditions were significantly less likely to experience consequences of harmful alcohol use. Additionally, participants in the therapist-delivered BI condition were significantly less likely to experience peer aggression and violence at 3-month follow-up than controls. Walton et al reported more promising findings in the second RCTs: compared to controls participants in the therapist-delivered BI condition reporting significantly less other drug use and delinquency at 3 months and reduced alcohol use at 6 months.¹⁴ Furthermore, compared to controls participants in the computerised BI showed less other drug use at 3-month follow-up and less cannabis use at both 3- and 6-month follow-up. Both RCTs concluded that there is considerable potential for integrating computerised delivery of BI (either self-completed by participants, or delivered by therapist) into health service practices^{14, 15}.

Table 4 Level II studies (Randomised Controlled Trials) included in this review (n=9)

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Guo, 2017 US ⁷	To evaluate a strengths-based outreach and advocacy intervention for young people at homeless shelters versus drop-in centres in reducing illicit drug use.	79 Homeless youth (14–24 years old) recruited via outreach from soup kitchens, parks, libraries, and other locations. Interventions were delivered in either drop-in centres (n = 40) or crisis shelters (n = 39).	Randomised controlled trial	<p>Participants were randomly assigned to receive crisis shelter linkage or drop-in centre linkage.</p> <p>Crisis-shelter linkage: The crisis-shelter was dedicated for youth aged <18 and open 24/7 and provided temporary overnight accommodation to meet basic needs with the aim of family reunification.</p> <p>Drop-in centre linkage: The drop-in centre was dedicated for homeless young people aged 14–24 years old and provided food, laundry and shower facilities as well as recreational activities. Drop-in staff additionally linked youth to community resources to support their engagement with services such as counselling and housing programs.</p>	Both groups of youths had reductions in the odds of illicit drug use (including heroin, amphetamines, cocaine and inhalants) from baseline to 9-months follow-up, with greater reductions in the drop-in centre linkage group.
Komro, 2017, US ⁸	To evaluate the effectiveness of a multilevel intervention designed to prevent underage alcohol use among youths living in the Cherokee Nation.	6 communities with high percentage of American Indians (n=692): 2 CONNECT intervention (n=118); Communities Mobilizing for Change on Alcohol (CMCA; n=141) and combined condition (n=433).	Randomised controlled trial	CMCA uses community-organizing strategies to galvanize adults to take actions to reduce youths' access to alcohol through social and commercial sources (the CMCA manual is available at tinyurl.com/CMCA-CONNECT).	Students exposed to CMCA showed a significant reduction in the probability over time of 30-day alcohol use (25%) and heavy episodic drinking (24%) compared with students in the control condition.
Mahu, 2015, UK ⁹	To examine the effectiveness of a personality-targeted intervention program (Adventure trial) delivered by trained teachers to vulnerable high-school students on reducing marijuana use and frequency of use.	21 secondary schools were randomised to intervention (n=12) or control (n=9) conditions, encompassing a total of 1038 HR student in the ninth grade	Cluster randomised controlled trial	Brief personality-targeted interventions (2 x 90min sessions) were administered to students with one of four high risk profiles: anxiety sensitivity, hopelessness, impulsivity and sensation-seeking.	Significant intervention effects on cannabis use rates at the 6-months follow-up in the intent-to-treat sample and significant reductions in frequency of use at 12 and 18-months follow-up, but this was not supported in two-part latent growth models. Subgroup analyses (both logistic and two-part models) reveal that the sensation-seeking intervention delayed the

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
					onset of cannabis use among sensation seekers
Milburn, 2012, US ¹⁰	To evaluate the efficacy of a short family intervention in reducing sexual risk behaviour, drug use, and delinquent behaviours among homeless youth.	151 families with a homeless adolescent aged 12–17 years old were recruited from diverse sites in Southern California.	Randomised controlled trial	The STRIVE intervention consisted of five sessions administered to the youth and parent(s) together by a trained facilitator. The session content was based on cognitive-behavioural theories, designed to improve families' problem-solving and conflict resolution skills.	Sexual risk behaviour, alcohol use, illicit drug use, and delinquent behaviours decreased significantly more during 12 months in the intervention condition compared with the control condition. Marijuana use, however, significantly increased in the intervention condition compared with the control condition.
Newton, 2016, Australia ¹¹	Evaluate the long-term impact of an intervention targeting personality risks for substance use	438 students categorized as high risk. 236 in intervention group; 202 in control group. Recruited in schools around Australia	Four-arm cluster randomised controlled trial	The PREVENTURE intervention was delivered in two 90-minute group sessions, 1 week apart by a certified facilitator and co-facilitator. The program includes psychoeducational strategies, specified for each personality trait. It includes exploring cognitive behavioural strategies that youth cope with issues and to challenge these coping strategies. Self-report measure at baseline, 12, 24 and 36 months follow-up. Measures included frequency of drinking, binge drinking and experience of alcohol related harms.	Relative to controls, students who received the PREVENTURE program had a significantly reduced growth over time in frequency of consuming alcohol, binge drinking and the experience of alcohol-related harms.
Pantin 2009, US ¹²	Evaluate the effectiveness of the Familias Unidas intervention with adolescents with behavioural problems on their substance use, sexual behaviours, externalising disorder and family functioning	227 Hispanic adolescents average age of 13.8 years with mild behavioural problems and their primary carer. 109 in intervention group, 104 in control group. Participants recruited via school counsellor who identified students with behavioural problems using the Revised Behaviour Problem Checklist	Randomised controlled trial	Familias Unidas is an intervention that works with immigrant parents to provide them with knowledge and skills to raise their children in the US. Trained facilitators work with parents to acquire these skills in 9 1-hour group sessions and use these skills with their children in 10 1-hour home visits. Four 1-hour booster sessions at 10, 16 and 22 months. Parents and adolescents completed computerised assessment of substance use and other behaviours in English or Spanish at baseline, 6, 18 and 30 months follow-up.	Relative to controls, adolescents receiving the interventions experienced significantly less increase in substance use at follow-up points compared the baseline. There were no significant differences between control and Familias Unidas participants in the change in externalising behaviour disorder. Relative to controls, adolescents in the Familias Unidas intervention did not differ in their frequency of sexual intercourse but did report significantly more condom use. Families in the Familias Unidas intervention reported significantly greater improvements in family functioning compared to control condition. Further analyses indicated that

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
					improved family functioning was a mediating factor on the intervention effect on substance use and condom use.
Spoth 2007, US ¹³	Examine a partnership-based family and school intervention effects on initiation, past-month and past-year substance use. And whether higher-risk (i.e. those who started using substances) students showed stronger intervention effects.	28 school districts, 12,022 6 th and 7 th grade (aged 11–14 years old) students and families; 6,091 in intervention, 5,931 in control. Community setting with family-based intervention and school-base intervention components.	Randomised controlled trial	Intervention: Community teams chose family-based intervention (strengthening Families Program) and school-based intervention (Project Alert, Life Skills Training and All Stars) Control and Intervention students completed self-report surveys at baseline and 18 months.	Relative to controls, intervention participants had lower AOD initiation rates, lower new-user rates of marijuana methamphetamine, ecstasy and inhalants and lower rates of past-year use of marijuana and inhalants. Higher-risk students showed stronger intervention effects for AOD initiation and past-month cigarette use.
Walton, 2010, US ¹⁵	Examine the effectiveness of therapist or computer brief intervention on violence and alcohol use	726 vulnerable youth (experience of alcohol use and violence in past year) aged 14–18 years old (63% African American or Hispanic); 237 in computer brief intervention; 254 in therapist brief intervention and 235 in control group. Participants recruited, screened and received intervention at Emergency Department.	Randomised controlled trial	Computerised: stand-alone interactive animated program. Therapist: facilitated by tablet laptop computer displaying tailored feedback for participants. Self-report measures at baseline, 3 and 6-months follow-up	Relative to controls, participants in therapist brief intervention were less likely to report severe peer aggression, any peer aggression and violence consequences at three months. Relative to controls, computer and therapist intervention participants were less likely to experience more than two consequences of alcohol consumption at six months. No significant findings for alcohol misuse or binge drinking were reported.
Walton, 2014, US ¹⁴	Prevent or delay initiation of cannabis use and reduce the extent of involvement with cannabis use, alcohol use, other drug use and delinquency using computerised or therapist brief intervention	714 youths aged 12–18 years old (73% African American or Hispanic); 233 in therapist brief intervention, 247 in computerised brief intervention and 234 in control. Participants recruited and received intervention in health clinics	Randomised controlled trial	Therapist brief intervention: therapist trained in motivational interviewing, followed content from computer screen Computerised brief intervention: self-completed by participant with buddy Control: received information flyer about Cannabis Baseline, 3, 6 and 12 months self-report measures of cannabis and AOD use and delinquency	Relative to controls, therapist brief intervention participants showed less other drug use and delinquency at three months and alcohol use at six months. Relative to controls, computerised brief intervention participants show less cannabis use at three and six months and other drug use at three months.

Comparative studies with concurrent controls (Level III-2)

This rapid review identified five publications covering four (16%) studies with concurrent (but not randomised) controls.¹⁷⁻²⁰ Table 5 outlines the objective, sample description, methods, intervention and findings for these studies. This section will detail the findings of each study.

Harris et. al¹⁷ tested a computer-facilitated system for screening, feedback and brief intervention (BI) in 2,096 adolescents (aged 12–18 years old) attending GP clinics in the US. The computerised screening tool asked about lifetime and past 12-month substance use, followed by the CRAFTT² questions. The screener included 10 pages of scientific information and real-life stories regarding the risks of substance use. GPs then received a summary of the participants' screening score and engaged in a 2 to 3-minute discussion with the adolescent about the health effects of substance use. Participants receiving the screening and BI had lower rates of any substance use compared to treatment as usual at 3- and 12-month follow-ups (number needed to treat for one person to respond ranged from 11 to 13). Among baseline drinkers, significantly more participants receiving the intervention reported abstinence at 3 months but this was not the case at 12 months. Among baseline abstainers, fewer people started drinking over the 12-month follow-up in the intervention group than the controls. Authors note that the intervention increased screening rates for alcohol by GPs and had a significant impact on later alcohol use but did not affect illicit drug use. This study should be interpreted cautiously given its non-randomised design and the differences between groups at baseline. There were insufficient data to assess any effects on the use of substances other than alcohol and cannabis.

The study by Ho¹⁸ tested a one-day youth injury awareness program P.A.R.T.Y. (Prevent Alcohol and Risk-related Trauma in Youth) to reduce risk taking and accidents among 225 juvenile justice offenders in Western Australia. The program aimed to improve young offenders' awareness of situations that can result in injury to enable them to make prevention-oriented choices and to adopt reduced-risk behaviours. Participants spent a day following the admission of a fictitious trauma patient at a local hospital (attending intensive care unit and trauma wards) and attend talks on the vulnerability of the brain and spinal cord to injury. After 33 months, routinely collected data from WA police and the Department of Health indicated that the proportion of traffic or violence-related offences was lower among people who attended the program vs. those who did not (3.6% vs. 26.8%). The same was true for injuries leading to hospitalisation (0% vs. 1.6%) and alcohol or drug-related offences (0% vs. 2.4%). The effects were similar for people of different backgrounds, including Aboriginal persons and those from lower socio-economic backgrounds. The authors noted that a longer-term follow-up was required to determine if these effects were sustained over time.

Holleran et al¹⁹ tested a youth-led adaptation of the prevention program Keepin' it REAL (KiR) involving 222 vulnerable young people aged 14–19 years old in a juvenile justice day program, a homeless shelter, four alternative high schools, low income housing, an LGBTQ youth centre and a youth group on the Texas-Mexico border in the US. The program, which was originally developed for use in schools, had four key drug resistance strategies with the primary focus on abstinence: Refuse, Explain, Avoid and Leave (REAL). Of the 73 students who completed all three follow-ups, participants in the adapted KiR program reported decreased acceptance of beer/wine and liquor from baseline through to follow-up, whereas the comparison group reported increased acceptance of beer/wine and liquor across all three waves of follow-up. In terms of past-month use of substances, only the adapted KiR program participants reported consistent decreases,

²C: Have you ever ridden in a CAR driven by someone (including yourself) who was "high" or had been using alcohol or drugs?; R: Do you ever use alcohol or drugs to RELAX, feel better about yourself, or fit in?; A: Do you ever use alcohol/drugs while you are by yourself, ALONE?; F: Do you ever FORGET things you did while using alcohol or drugs?; F: Do your family or FRIENDS ever tell you that you should cut down on your drinking or drug use?; T: Have you gotten into TROUBLE while you were using alcohol or drugs?.

including significant reductions in past month use of wine and liquor, but non-significant reductions for beer and marijuana. The adapted program was superior to the non-adapted program, which was less relevant to vulnerable youth because it did not reflect their culture or life experiences. Qualitative feedback showed that the adapted program was more appropriate for younger students who had not yet initiated use and that abstinence-focused approaches were inappropriate for participants who had already started using substances — and for whom case studies of negative outcomes of using substances may have been a more appropriate strategy. These outcomes need to be interpreted cautiously because of the lack of random assignment to treatment conditions and differences between groups at baseline.

Wiggins et al ²⁰ tested the effectiveness of a youth development program to reduce teen pregnancy, substance use and other health outcomes among 2,724 vulnerable 13–15-year-olds attending 54 youth service sites in England. The program comprised a comprehensive suite of education, training/employment opportunities, life skills, mentoring, volunteering, health education (including sexual health and substance use), arts, sports and assistance accessing relevant health services. These activities were delivered for 6–10 hours a week to young people identified by teachers or other care professionals to be at risk of teen pregnancy, substance use or school exclusion. At 1 and 2-year follow-ups there was no difference between intervention and comparison groups on any measure of substance use, contact with police, or official warnings or convictions. There were difficulties in recruiting staff and convincing them to implement the intervention in the same way across sites. Authors cautioned that the data was self-report only so may have been biased.

Table 5 Level III-2 studies (comparative studies with concurrent controls) included in review (n=5)

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Harris, 2012 US ¹⁷	To evaluate a computer-facilitated screening and brief advice system to screen for substance use in adolescents.	2,096 12–18-year-olds attending 9 primary care offices in New England, US.	Quasi-experimental asynchronous design	The CRAFFT screening interview was used to identify lifetime and 12-month substance use for all patients attending the practice, producing an overall score and risk level for each patient (low, medium, high). All patients then viewed 10 pages of scientific information and true-life stories illustrating the health risks of substance use. GPs received a prompt, and 6-10 talking points to generate a conversation about substance use during their consultation.	Compared to treatment as usual, patients receiving the brief screening and advice reported lower rates of any substance use at 3- and 12-month follow-ups. This included lower rates of 3-month (15.5% vs 22.9% and 12-month alcohol use (29.3% vs. 37.5%).
Ho, 2012a and Ho 2012b Australia ¹⁸	To evaluate a 1-day youth injury awareness education program on risk taking behaviour, traffic or violence-related offences and alcohol or drug-related offences among juvenile justice offenders.	225 juvenile justice offenders in Western Australia aged 16–17 years old convicted by court magistrates between 2006 and 2010, who received the 1-day brief intervention.	Retrospective cohort study of program attendees vs. non-attendees	PARTY (Prevent Alcohol and Risk-related Trauma in Youth) is a one-day youth injury prevention program developed in Canada. It provides information to young people about injury-producing situations and aims to assist in making informed prevention-oriented choices and adopting behaviours to minimise the risk of injuries. Participants receive talks on pre-hospital care and the vulnerability of the brain, and visit the emergency department, intensive care unit and trauma wards of a local hospital. Participants are shown when and why serious injury is likely to occur	Significant declines were identified for those attending the program vs. those who did not on: traffic or violence-related offences (3.6%, vs 26.8%), injuries leading to hospitalisation (0% vs 1.6%), and alcohol or drug-related offences (0% vs 2.4%). Estimated costs: <ul style="list-style-type: none"> • Per offence prevented: \$3,124 • Per serious injury avoided: \$42,169 • Per discounted life year gained: \$17,910.
Holleran, 2014, US ¹⁹	To adapt the Keepin' it Real (KiR) intervention to local youth's culture and evaluate its effectiveness in reducing/prevention of substance use and acceptance,	A total of 222 youth aged 14–19 years old enrolled in the study. Study sites included alternative schools, homeless youth shelter, juvenile justice day program, YMCA-run program for low-income youths, drop-in centre for LGBTQ youth	Pretest and follow-up design with non-randomly assigned comparison groups	The KiR curriculum was adapted to fit non-school settings, which included shortening the sessions to a 6-week program and including videos and stories that resonate more with the higher-risk youth. KiR aims to develop drug resistance strategies. One group received the adapted KiR, second	Comparison participants' acceptance of substances went up over the follow-up periods, acceptance of substances among unadapted KiR participants went down at post-test but increased again at follow-up. Substance acceptance went down at

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
	compared the unadapted KiR and a comparison group	and a youth advocacy group on the Texas-Mexico border. Analyses were conducted with 73 students who completed all questionnaires		group received the unadapted KiR and third group was a comparison group. Measures: participant self-report of past month use of beer, wine, liquor and marijuana and acceptance of beer, wine, liquor and marijuana when offered. Measures at baseline, post-test and six weeks follow-up	post-test and follow-up among adapted KiR participants. Both the adapted and unadapted KiR participants show greater reductions in substance use than the comparison group, however the adapted KiR participants showed greater reductions than the unadapted KiR participants.
Wiggins, 2009, UK ²⁰	Report on sexual health, substance use, truancy and offending outcomes of a youth development intervention in England	2,724 youth aged 13–15 at risk of school dropout, substance use or teenage pregnancy attending services; 1,637 in YPDP and 1,087 in comparison sites. Participants recruited at program site, or nearby.	Prospective matched cluster comparison pre-post	Youth People's Development Programme (YPDP) offering a combination of education, training/employment opportunities, health education (primarily sexual health and substance use), arts, sports and advice on accessing services. Self-report surveys measuring sexual health, substance use, mental health, school outcomes and offending. Measured at baseline, 1 and 2 years later.	No significant differences in substance use outcomes between YPDP participants and comparison group. No significant differences in offending outcomes between YDPD participants and comparison group.

Comparative studies without concurrent controls (Level III-3)

Four (17%) comparative studies without concurrent controls were identified.²¹⁻²⁴ Table 6 summarises the objectives, sample size, research design, methods/intervention and the findings. All studies were conducted in the US. Three used experimental designs by the same authors evaluating the effects of BIs on alcohol use, culture and arrests or delinquency²²⁻²⁴, and one was a longitudinal study using surveillance survey data to evaluate the impacts of an evidence-based community prevention program²¹.

Dembo et al²² presented interim findings from an experimental study involving truanting youths with a maximum of two offences. Their aim was to determine whether alcohol use and sexual risk behaviours were longitudinally related; examine the effects of a prospective, longitudinal BI developed for drug-involved truant youth on alcohol use and sexual risk behaviours; and, identify and assess the impact of the BI on subgroups. The BI provided counselling services for drug-related issues to truanting youths and was compared to standard truancy treatment (not detailed). The researchers found that youths that were more involved in alcohol use at baseline were significantly more likely to report a greater involvement in sexual risk behaviour. No support was found for the hypothesis that BI treatment would reduce alcohol use and sexual risk behaviours over the follow-up year.

Dembo et al²³ described the impact of BI services on arrests for the truant youth over a 12-month, post-intervention follow-up period. After controlling for the predictor variables, the youth who received BI had a nearly significant lower rate of arrest charges during the third follow-up period (i.e. months 7 through 12). BI was marginally significantly better in reducing delinquency among truants than the standard truancy program.

Finally, Dembo et al²⁴ published a third article which described the impact of BI services on the youths' self-reported delinquency over an 18-month follow-up and arrests over a 24-month follow-up. A number of significant and sizeable BI intervention effects were identified as well as a number of marginally significant BI effects. In particular, they found significant reductions in arrests at 24-month follow-up for youths who received BI compared to controls.

Feinberg et al²¹ conducted a longitudinal study of a large-scale, coordinated initiative called Communities that Care (CTC) in Pennsylvania, in the US. They used biannual surveillance data collected through anonymous in-school student surveys to examine the impact of CTC that commenced in the late 1990s and reached 120 communities. CTC aimed to form collaborative community partnerships among community stakeholders to support the implementation of evidence-based programs that reduce risk and enhance protective factors for adolescent behaviour problems (e.g. substance use, delinquency, violence, school drop-out). The research found that youth in CTC communities demonstrated less delinquency but not substance use than youth in non-CTC communities. Among CTC community grade-cohorts that were exposed to evidence-based, universal prevention programs, levels of risk factors increased more slowly, and protective factors and academic performance decreased more slowly, than they did for comparison grade cohorts. These findings suggest that community coalitions can improve adolescent risk and protective behaviours at a population level when evidence-based programs are implemented.

Table 6 Level III-3 studies (Comparative studies without concurrent controls) included in review (n=5)

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Level III-3 Comparative studies without concurrent controls					
Dembo, 2014, US ²²	Interim findings from an experimental study involving truant youths with a maximum of two offences to determine whether alcohol use and sexual risk behaviours were longitudinally related, to examine the effects of the BI on alcohol use and sexual risk behaviours, to identify subgroups of youths involved in alcohol use and sexual risk behaviours, and to assess the impact of the BI on these subgroups.	200 taunt youth at baseline, 107 truant youth at 12-month follow-up, aged 11–17 years old (mean 14.79 years); 65% male; thirty-eight percent of the youths were Caucasian; 26% were African-American; 28% were Hispanic; 2% were Asian; and 7% were from other, mainly multiethnic, backgrounds. The main place of recruitment into the BI project occurred at the Hillsborough County Juvenile Assessment Center, TIC. In addition, eligible participants were recruited from a community diversion program, as well as social worker or guidance counsellor referrals	Experimental design	BI therapist sessions to promote abstinence and prevent relapse among drug-using adolescents through the development of adaptive beliefs and problem-solving skills. The BI incorporates elements of rational-emotive therapy (RET) and problem-solving therapy (PST) to develop adaptive beliefs and coping skills. Measured at baseline, 3-, 6-, and 12-month follow-up.	Youth who were more involved in alcohol use at baseline were significantly more likely to report a greater level of involvement in sexual risk behaviour. No support that the BI treatment would reduce alcohol use and sexual risk behaviours over the follow-up year among the truant youths.
Dembo, 2014, US ²³	To describe the impact of BI services on official arrest charges for the truant youths over a 12-month, post-intervention follow-up period.	Primary recruitment occurred at a truancy centre and a community diversion program, and referrals from any social worker or guidance counsellor associated with the school district. Eligible youths were aged 11–17 years old; no official record of delinquency or up to two misdemeanour arrests; substance use; and live in region. 180 youths enrolled in the truancy intervention project between 2007- 2010. A total of 65% were male and averaged 14.79 years in age. 39% of the youths were Caucasian, 23% African-American, 28% Hispanic, 2% Asian, and 8% were from ethnic backgrounds	Experimental design	BI therapist sessions to promote abstinence and prevent relapse among drug-using adolescents through the development of adaptive beliefs and problem-solving skills. The BI incorporates elements of rational-emotive therapy (RET) and problem-solving therapy (PST) to develop adaptive beliefs and coping skills. Measured at baseline, 3-, 6-, and 12-months follow-up. Follow-up data included juvenile and adult arrests, time in a secure justice system or treatment facility, since the 12 months following their date of last participation in the intervention.	After controlling for the predictor variables, youths receiving BI had a near significant, lower rate of arrest charges during the third follow-up period (i.e., months 7 through 12). As such, the BI was found to be marginally significant in effecting future delinquency among truants, compared to the standard truancy program.
Dembo, 2016, US ²⁴	To describe the impact of BI services on the youths' self-reported delinquency over an 18-month follow-up period	The main place of recruitment into the BI project occurred at a school-based south Florida Juvenile Assessment Center, or Truancy Intake Center (TIC). Eligible	Experimental design	BI therapist sessions to promote abstinence and prevent relapse among drug-using adolescents through the development of adaptive beliefs and problem-solving skills.	A number of significant BI intervention effects with sizable effect sizes were found, as well as a number of marginally significant BI

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
	and of arrest charges over a 24-month follow-up period.	youths were aged 11–17 years old; no official record of delinquency or up to two misdemeanour arrests; substance use; and live in region. A total of 753 were eligible and 300 agreed to participate in the baseline interviews. Completion of follow-up interviews depended on when youths entered the project: 3-month (N=282), 6-month (N=281), 12-month (N=245), and 18-month (N=215) follow-up interviews.		The BI incorporates elements of rational-emotive therapy (RET) and problem-solving therapy (PST) to develop adaptive beliefs and coping skills. Measured at baseline, 3-, 6-, and 12-, 18- and 24-month follow-up. Follow-up data included juvenile and adult arrests, time in a secure justice system or treatment facility, since the 12-24 months following their date of last participation in the intervention.	effects. In particular, significant reductions in arrest charges at 24-months follow-up for youths receiving BI services compared to controls were among the key findings of this study.
Feinberg, 2010, US ²¹	Researchers conducted a longitudinal study of Communities That Care (CTC) program (which uses evidence-based prevention to reduce risk factors and increase protective factors) in Pennsylvania utilizing biannual surveillance data collected through anonymous in-school student surveys.	A total of 59,725 surveys have been completed from 2001-2005. The school districts in the combined 2001-2005 sample had an average of 7.2% of households below the poverty line (SD=3.8); and an average of 16.1% single-parent female-headed households (SD=7.2). Apart from two major metropolitan regions, Pennsylvania is largely composed of rural areas, and small towns and cities and is predominantly white. There was little participation in PAYS among the main school district in each of the two major metropolitan areas.	Experimental design	CTC involves the formation of collaborative community partnerships among community stakeholders to spearhead adoption and support of EBPs that have been shown to reduce risk and enhance protective factors for adolescent behaviour problems (e.g., substance use, delinquency, violence, school drop-out). The Pennsylvania Youth Survey (PAYS) was collected in 2001, 2003 and 2005 The student self-report measure utilised for the PAYS is the CTC Youth Survey, which assesses risk and protective factors for adolescent ATOD and delinquency and has been well-validated.	Youth in CTC communities demonstrated less growth in delinquency, but not substance use, than youth in non-CTC communities. Levels of risk factors increased more slowly, and protective factors and academic performance decreased more slowly, among CTC community grade-cohorts that were exposed to evidence-based, universal prevention programs than comparison grade cohorts. Community coalitions can affect adolescent risk and protective behaviours at a population level when evidence-based programs are utilised.

Case Series (Level IV)

This rapid review identified four (16%) case series.²⁵⁻²⁸ Table 7 summarises their objectives, sample size, research design, methods/intervention and findings. One evaluated a hospital-based substance use prevention program²⁵, one evaluated three juvenile drug courts²⁶, one evaluated a community-based prevention intervention for Aboriginal adolescents²⁷ and one evaluated a school-based intervention for Native Americans.²⁸ Three studies were conducted in the US^{25, 26, 28} and one in Australia.²⁷

Brown et al²⁵ evaluated the effectiveness of a hospital-based substance use intervention program that was delivered by one program facilitator as part of the hospital's trauma support program. The program consisted of seven elements (See Table 7) which were delivered to 27 adolescents in one-on-one sessions over six to eight weeks. Participants reported significant increases in negative attitudes towards alcohol between pre-test and 3-months follow-up.²⁵

Hiller et al²⁶ evaluated the effectiveness of three juvenile drug courts attended by youth aged 13–17 years old for a 9-, 10- or 12-month duration. Each drug court consisted of three phases (see Table 7). Based on file review of drug court participants, 83% tested positive for drugs during 12 months of involvement in the drug court. The majority (78%) tested positive for marijuana. Nearly half (44%) received new charges while in the program. Hiller et al concluded that the study had many limitations and more research was needed to evaluate the effectiveness of juvenile drug courts²⁶.

Lee et al²⁷ evaluated a community driven program called the Youth Hub, which focused on cultural enhancement, education and recreational activities. The findings did not show any improvements in youth school attendance or arrests in the participating community. Qualitative findings reported increased opportunities for youth, increased interaction between local services and the community and increased agency of the community. There were also reductions in cannabis use among 13 to 36-year-old females and males aged 16 years and older. Lee et al concluded that collaborative community approaches have the potential to increase community connectedness and address problem behaviours among youth. Programs that combine skills training opportunities with recreational activities provide an alternative to substance use for youth.²⁷

Patchell et al²⁸ evaluated a circle talk intervention as a strategy for substance prevention for Native American Indian adolescents. The intervention took place over an 8.5-week period and consisted of 30–45 group sessions 2–3 times per week, led by a trained Native American facilitator. The topics discussed are listed in Table 7. The study found significant reductions in substance use/abuse at follow-up compared to baseline.²⁸

Table 7 Level IV studies (Case series with either post-test or pre-test/post-test outcomes) included in review (n=4)

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Level IV Case series with either post-test or pre-test/post-test outcomes					
Brown, 2015 US ²⁵	To evaluate the effectiveness of a hospital-based adolescent substance use intervention program.	27 adolescents (29,6% female) aged 13–19 years old (mean age 16.7). The Youth Alternative Solutions Program (YASP) is a Hospital based intervention. Participants spent, on average, 6–8 weeks actively participating in the YASP intervention.	Pre-post	A single program facilitator employed by the hospital's trauma support services centre delivered all components of the program. The program consisted of seven distinct components delivered over the course of eight weekly sessions, including (a) program orientation; (b) a one-on-one entrance interview with the program facilitator that included a needs assessment and baseline drug test; (c) two workshops focusing on the physiological effects of SU, positive behavioural choices, and healthier coping skills; (d) a presentation at the county Coroner's office; (e) emergency department and inpatient trauma unit visits lead by frontline nurses; (f) attending an approved 12-step program meeting; and (g) an exit interview to ensure completion of all required program components and a final drug test.	Significant increase in negative alcohol expectancies from pre-test to 3-month follow-up.
Hiller, 2008 US ²⁶	To evaluate the effectiveness of three juvenile drug courts.	65 13 to 17-year-olds attending one of 3 juvenile drug courts in the US (Program 1: n = 28; Program 2: n = 26; Program: 3 n = 11).	Retrospective file review; drug court staff interviews; focus groups.	<p>Three juvenile drug court programs of 9, 10 and 12-months duration (program capacity ranged from 15-25 people), each with 3 phases in which the number of treatment sessions, weekly drug screens and drug court sessions gradually decrease over time.</p> <p>Each drug court targeted drug-and alcohol-involved youth (boys and girls) aged 13 –17 years old at various stages of the judicial process, including post-adjudicated, committed, on probation and re-entry.</p> <p>All courts provided inpatient or outpatient intensive substance abuse treatment services (either in-house or via referral to a local treatment agency), case</p>	<p>Arrests: 22% of youth received new criminal charges on the program, 5% received new felony charges and 17% received a new misdemeanour charge.</p> <p>Drug use: 17% of youth did not test positive for drugs during the 12-month evaluation period. Of those with a positive drug screen, most were positive for marijuana (78%), followed by cocaine (20%) and opioids (12%).</p> <p>Retention in drug courts: 69% of participants remained involved in</p>

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
				management by drug court staff, random urine drug testing with sanctions for positive screens (including curfew restriction, home incarceration with monitoring, community service, book reports and short periods in goal.	the courts, 10% graduated and 21% were discharged for various reasons, including non-compliance, absconding or transfers.
Lee, 2008, Australia ²⁷	To examine the role, methods and probable effectiveness of a community-driven youth preventive initiative, the Youth Development Unit ('the Unit') in reducing the risk of substance misuse and increasing resilience and connectedness in a group of Indigenous communities in Arnhem Land (NT).	Data included community, staff and stakeholder interviews and observation.	Qualitative and quantitative measures were used to assess acceptability and effectiveness in the initiative's first 2 years of operation (June 2003 – June 2005).	Community run intervention focussing on cultural enhancement, education and recreational activities.	Interviewees reported increased youth training and recreational opportunities, increased communication between local agencies, overall satisfaction with programme delivery and optimism that it could achieve its goals. Comparing the 2 years before and after the Unit's implementation, there were no significant changes in school attendance (55.9% versus 51.3%) or youth apprehensions (68 versus 75).
Patchell, 2015, US ²⁸	Examine the impact of a tribal-specific substance abuse prevention for vulnerable Native American Indian adolescents on self-reliance and substance use.	44 vulnerable Native American Indian adolescents, aged 16 –18 years old. Adolescents were recruited in schools with help from school counsellor to identify vulnerable adolescents (those who are vulnerable of substance abuse.	One group pre-post-test study.	Native Talking Circle Intervention (NTCI) consisted of a 30-45 group session, 2–3 times per week over a 8.5-week period, led by a Native American facilitator of the same tribe. Topics discussed in the NTCI included being responsible (includes drug and alcohol education and how to recognize problems and vulnerable situations), being disciplined and being confident. Self-report surveys at baseline and directly post-intervention including Cherokee Self-Reliance Questionnaire and Substance Problems Scale.	There were significant positive changes at follow-up compared to baseline. There was a significant reduction in substance use/abuse at follow-up compared to baseline.

Review question 1: Effective prevention and early intervention programs

Prevention programs

This rapid review identified various prevention approaches for substance use amongst vulnerable youth, including: mentoring, personality-targeted programs, family-based programs, community-based programs, screening and brief intervention, and a school-based program adaptation. Some of these approaches are supported by strong evidence from literature reviews of RCTs (Level I) or one or more RCTs (Level II). Overall, however, more evidence is required from multiple rigorous studies to more confidently assess whether each program is an effective prevention approach for vulnerable youth. Nonetheless, this rapid review identified prevention programs that are likely to be effective for vulnerable youth. This section will summarise the available evidence for each prevention program.

Mentoring

Mentoring approaches have been among the most widely used prevention approach for vulnerable youth, especially in the US. Tolan et al conducted a systematic review of RCTs and quasi experimental studies (Level I) and identified 146 studies evaluating mentoring approaches between 1970 and 2011.⁶ This rigorous review and meta-analysis of methodologically adequate studies found that mentoring approaches were beneficial for vulnerable youth in reducing substance use, delinquency, aggression and improving academic achievement. More beneficial outcomes were found from mentoring programs in which the mentor-mentee relationship had a focus on advocacy and emotional support, and in which the mentor was motivated by professional development.

Further improvements can be made to the evidence around mentoring approaches by formulating key processes and focussing on more standardised approaches. Overall, while there is support for mentoring as an approach to prevent delinquency and related outcomes (such as substance use) for vulnerable youth, it is difficult to recommend which type of programs given the variability between mentoring programs and limited understanding of what the key processes are in an effective mentoring program.

Personality-targeted programs

Personality-targeted programs use personality traits to target prevention programs at youth at risk of problematic substance before they start using substances. The two included RCTs (Level II) of personality-targeted programs found mixed results. Newton et al found the personality-targeted program PREVENTURE to reduce the frequency of alcohol consumption, binge drinking and experiences of alcohol-related harms.¹¹ Mahu et al on the other hand, only found that their ADVENTURE program delayed the onset on cannabis use in participants with sensation-seeking personality types. They found no intervention effects for other participants on alcohol or cannabis use.⁹ While both these studies were conducted within a school setting, it is likely that they can be transferred to other settings because the intervention was delivered by a trained facilitator who could be a teacher, counsellor, youth worker or other kind of support worker. It is a brief program with two 90-minute group sessions, making it feasible to implement in services with more transient contact with their clientele. More evidence is needed to support the effectiveness of personality-targeted programs, but the findings of the RCT conducted in Australia show that this intervention has promise in the NSW setting.¹¹

Family-based interventions

Family-based interventions address family-based risk and protective factors by improving family functioning in order to prevent or reduce substance use or other at-risk behaviours among vulnerable youth. In some programs, parents of vulnerable youth are engaged in the intervention along with the adolescents^{10, 13} and in other programs just the parent.¹² Three RCTs (Level II) identified in this rapid review (all conducted in the US) suggest that family-based interventions show promise in preventing and reducing

substance use among vulnerable youth, including homeless adolescents ¹⁰, Hispanic adolescents with behavioural problems ¹² and youth who were at risk of alcohol use. ¹³ These RCTs provided support for family-based interventions as a substance use prevention approach for vulnerable youth. However, the family-based interventions evaluated in these RCTs had a minimum of five ¹⁰ and a maximum of 19 sessions ¹², making it an intensive prevention approach. Furthermore, while all family-based interventions were evaluated in RCTs (Level II evidence) and found evidence for their effectiveness, none of them were based in Australia. They would need cross-cultural translation if they were to be implemented in NSW.

Community-based interventions

Community-based interventions are approaches in which community members collaboratively implement a suite of (evidence-based) programs to prevent and reduce substance use among adolescents in the community. Three community-based interventions were identified in this rapid review; two with Indigenous populations (one involving Native Americans ⁸ and one Aboriginal Australians ²⁷); and, one in general communities. ²¹ The RCT (Level II) of the CMCA with Cherokee communities found a reduction in the probability of 30-day alcohol use and episodic drinking for youth in the CMCA communities compared to participants in control communities. ⁸ A longitudinal study (without controls; Level III-3) of CTC did not find reductions in substance use among youth in the CTC communities but did find reductions in delinquency, and a lesser reduction in protective factors and academic achievement. ²¹ Finally, a case series study (Level IV) of an Aboriginal community-initiated prevention hub for youth identified reductions in cannabis use among young females and older males, and improvements in youth training and recreational opportunities. ²⁷ More evidence is needed on the effectiveness of community-based interventions to prevent substance use among vulnerable youth because this rapid review only identified one relevant RCT.

Screening and brief intervention

Screening and brief intervention was assessed with mixed results. Walton et al did not find that either a therapist-delivered or a computer-delivered BI delayed initiation of cannabis use in their RCT. ¹⁵ Harris et al, on the other hand, found that participants who were abstinent at baseline and received a computer facilitated BI were less likely to start drinking than the (non-randomised) control group ¹⁷. More research is required to assess the effectiveness of BI in prevention of substance use. BI may be more appropriate as an early intervention approach.

School-based program adaptation

School-based program adaptation included a program that was intended for delivery at schools but was adapted to a different setting. One such program was identified in a study by Holleran et al ¹⁹ who adapted the KiR curriculum to delivery in vulnerable youth setting (i.e. juvenile justice day program, a homeless shelter, four alternative high schools, low income housing, a LGBTQ youth centre and a youth group on the Texas-Mexico border in the US). ¹⁹ Participants in both the adapted and the unadapted program showed reduced acceptance of alcohol and reductions in use of liquor and wine than the (non-randomised) control group. However, the reductions were greater for the adapted program and the adapted program was better received and thought to be more relatable to the vulnerable youth than the unadapted program. This evidence from one Level III-2 study is not strong enough to confidently state that this is an effective approach, but it is an interesting example of how school-based prevention programs can be adapted to delivery in other contexts for vulnerable youth and show promising outcomes for substance use prevention.

Effective early intervention

This rapid review identified various early intervention programs that were used to reduce substance use among vulnerable youth. These included: mentoring, SBIRT, family-based interventions, and in-service advocacy and health promotion programs. While some of these approaches (especially mentoring, SBIRT

and family-based interventions) are supported by evidence from literature reviews of RCTs (Level I) or by one or more RCTs (Level II), overall more evidence is required from multiple rigorous studies to more confidently support each program as an early intervention approach to reduce substance use among vulnerable youth. Nonetheless, this rapid review identified programs that are likely to be effective for vulnerable youth, and worthy of trial and evaluation. This section summarises the evidence for each early intervention program.

Mentoring

Mentoring approaches are also used as early intervention programs for vulnerable youth.⁶ The systematic review of RCTs and quasi experimental studies (Level I) conducted by Tolan et al also included mentoring as an early intervention/treatment approach for vulnerable youth.⁶ The findings were the same, with beneficial outcomes for vulnerable youth in reduced substance use, delinquency and aggression, and improved academic achievement. While there is support for mentoring as an early intervention approach for vulnerable youth, uncertainties remain about the key ingredients of effective mentoring programs.

Screening and brief intervention (and referral to treatment)

Screening and brief intervention (and referral to treatment) is an early intervention approach in which the participant is screened for alcohol and/or other drugs use and given personalised feedback on their substance use and motivational interviewing to identify alternatives to substance use and increase motivations to reduce use. A total of seven studies in this rapid review evaluated SBIRT (or BI) as early intervention program for vulnerable youth. This included a literature review of RCTs (Level I)⁵, two RCTs (Level II)^{14, 15}, one quasi-experimental study with control group (Level III-2)¹⁷ and three experimental studies without controls (Level III-3).²²⁻²⁴ The literature review by Mitchell et al identified 15 RCTs of SBIRT in primary care, ED, school and community settings.⁵ Findings from the RCTs were mixed with some reporting positive findings for reduction in alcohol use, cannabis use, self-reported substance use and illicit drug use, but others reporting no changes in substance use following SBIRT.⁵ Walton et al conducted two RCTs (Level II) of BI comparing computerised BI and therapist BI to a comparison group.^{14, 15} The first RCT, conducted in an ED setting, did not find an effect on alcohol use outcomes for either therapist BI or computerised BI. It found a significant reduction in experiencing two or more consequences of alcohol use in both BI conditions compared to controls.¹⁵ Therapist BI participants were also less likely to report aggression than controls. The second RCT, conducted in a primary care setting, found that therapist BI participants reported less other drug use at 3-months follow-up and alcohol use at 6-month follow-up than controls.¹⁴ Participants in the computerised BI reported less cannabis use at 3 and 6-months follow-up and less other drug use at 3-month follow-up than controls.¹⁴

Harris et al conducted a quasi-experimental study with (non-randomised) controls (Level III-2) of BI in a primary care setting.¹⁷ Their study found that BI participants experienced lower rates of substance use at 3 and 12-months follow-up than controls. Participants reporting drinking at baseline were more likely to be abstinent at 3-months follow-up than controls but not at 12-months follow-up.¹⁷ These findings need to be interpreted with caution given the non-randomised nature of the study, and baseline differences between BI and control participants.

Dembo et al conducted a series of studies without control group (Level III-3) to evaluate the impact of BI on substance use and arrests for truancy in at risk youth.²²⁻²⁴ They did not find any evidence that BI reduced alcohol use²² but found a reduction in arrests at 7 to 12-month follow-up²³ which was sustained at 24-months follow-up.²⁴ Again, these findings need to be interpreted with caution given the lack of a control group.

While there is growing evidence that SBIRT is an effective early intervention strategy for vulnerable youth, the level of evidence is not yet as strong as that for adult SBIRT⁵. Furthermore, the referral to treatment

component of SBIRT is underutilised in youth compared with adult SBIRT. Increasing utilisation of this aspect of SBIRT might increase the effectiveness of this early intervention approach in vulnerable youth.

The included studies ^{14, 15} also seem to indicate that computerised BI might be as effective as therapist-delivered BI. Most therapist BI are also delivered using a computer and only require the therapist to be trained in motivational interviewing. It remains unclear whether SBIRT can be beneficial in a police setting, although the feasibility of computerised SBIRT in this setting has been identified. ²⁹ The effectiveness of SBIRT in the adult population, the emerging evidence of SBIRT for vulnerable youth and the brief nature of this early intervention approach all make SBIRT a promising intervention to implement with vulnerable youth in NSW. However, more rigorous Australia-based studies are required before we can confidently recommend this program.

Family based interventions

Family-based intervention aim to reduce substance use by intervening with the parents to improve family functioning. Family-based interventions can be used for prevention or early intervention. Three RCTs (Level II) evaluated their effectiveness as an early intervention and prevention approach for homeless youth ¹⁰, Hispanic youth with behavioural problems ¹² and general community-based youth ¹³. Milburn et al found that the STRIVE intervention (in which parents and adolescents attend five sessions to reconnect homeless youth with their parents) reduced alcohol and illicit drug use, and delinquent behaviour during 12 months. ¹⁰ However, cannabis use increased more in the intervention participants than the controls. ¹⁰ The Familias Unidas intervention was associated with a reduction in substance use among participants compared to controls in Hispanic adolescents with behavioural issues. ¹² While the three RCTs of family-based interventions show considerable promise as an early intervention approach in reducing substance use among vulnerable youth, more evidence is needed on the effectiveness of this approach in Australia.

In-service advocacy and health promotion approaches

In-service advocacy and health promotion approaches are provided to better connect vulnerable youth with existing services or promote alternative, healthy strategies. This rapid review identified a strength-based advocacy approach for homeless youth ⁷, a one-day ED-based injury awareness program ¹⁸ and a hospital-based health promotion program. ²⁵ Guo et al evaluated the advocacy approach with a RCT (Level II) in which an outreach worker supported homeless youth who were randomly assigned to attend a homeless shelter or a drop-in centre. While both groups showed reductions in illicit drug use at 9-month follow-up the reductions were greater for the youth in drop-in centres. ⁷ Guo et al hypothesised that this was because the drop-in centres were more flexible than the homeless shelters. ⁷

Ho et al tested the P.A.R.T.Y. injury awareness program for juvenile offenders in which they followed a fictitious trauma patient at a local hospital. ^{17, 18} Juvenile offenders exposed to the program had lower rates of violence-related offences, injuries leading to hospitalisation and substance-related offences at 33-months follow-up than those not exposed to the program (not a randomised control, Level III-2). These results were the same for offenders of different backgrounds, including Aboriginal Australians and lower SES groups. ¹⁸

Brown et al conducted a pre-post (Level IV) evaluation of a hospital-based health promotion program delivered by one program facilitator in the trauma support centre. Participants showed a significant increase in negative alcohol expectancies at 3-month follow-up. ²⁵

Overall, not enough evidence exists for in-service health promotion and advocacy programs, but these studies indicate a potential for these approaches. The P.A.R.T.Y. program evaluated by Ho et al ¹⁸ shows promise as a cost-effective early intervention to implement and because it was implemented in Perth it may not require cross-cultural translation.

Finally, drug courts ²⁶ and a youth development program in the UK ²⁰ were not found to reduce the substance use of participants. Both programs were weakly evaluated so more rigorous evaluations are needed to draw conclusions about their ineffectiveness.

Review question 2: participant characteristics and core components of effective prevention and early intervention

Participant characteristics

Age

Participants of the effective prevention and early intervention programs ranged from 11–19 years old. No trends could be discerned between age groups and effectiveness of prevention or early intervention programs; they appeared equally effective for all age groups.

Homelessness

Four effective early intervention programs targeted homeless youth. ^{5, 7, 10, 19} These programs were a SBI ⁵, a family-program ¹⁰, drop-in centre ⁷ and an adaptation of a curriculum-based program. ¹⁹ Substance use, especially illicit substances, reduced among homeless participants in all four studies. Interestingly, two studies did not find a reduction in cannabis use despite reductions in other illicit substances. ^{5, 10}

Minority groups

Three effective prevention and early intervention programs targeted minority groups. Given these studies were based in the US, these groups were primarily Hispanic and African American youth. In addition to belonging to a minority group, the participants also had to display at-risk characteristics including: behavioural problems ¹², experiencing alcohol and violence in the past year ¹⁵, or attending a health service. ¹⁴ Two of the effective programs were SBI, indicating a cross-cultural effectiveness of this approach. ^{14, 15} The other program was a family-based program developed specifically for Hispanic youth, acknowledging the importance of family in Hispanic cultures and incorporating cultural elements to enhance its effectiveness.

¹²

Indigenous youth

Three studies had Indigenous participants: one Australian Aboriginal youth ²⁷ and two Native American youth. ^{8, 28} There were two school-based programs (one which was culturally adapted from a mainstream program ⁸, and one specifically developed for Native American youth ²⁸) and two community-based programs. ^{8, 27} One study evaluated a culturally adapted school-based and a community-based program, both of which were effective for the Native American youth participating in the programs. ⁸

Juvenile offenders

Two studies of effective early interventions targeted juvenile offenders. ^{18, 24} The PARTY intervention was highly effective for juvenile offenders in reducing violence related offences, injuries leading to hospitalisation and alcohol or drug-related offences. Screening and brief intervention sessions with juvenile offenders were found to be effective in reducing arrest charges, but not in substance-related outcomes. ²⁴

Youth accessing services

Two studies targeted youth that attended a health service but were not otherwise defined as vulnerable. Services were either a GP or a hospital. Participants attending the GP service received a brief intervention that was facilitated by a computer. This intervention was effective in reducing substance use 3 and 12-months following the intervention. ¹⁷ The hospitalised youth received a seven-component program that was delivered over eight weeks, and included workshops, ED visits and attending the 12-step program. Following the program, the participants showed more negative alcohol expectancies. ²⁵

At-risk definition

In addition to the above categories, four studies used their own definition of 'at-risk' or vulnerable.^{6, 9, 11, 13} In the review of mentoring programs by Tolan et al, at-risk was defined based on a high score on screening for aggression, oppositional or deviant conduct disorders, school failure and anti-social behaviours.⁶ Mentoring programs were effective for youth scoring high on these characteristics. Mahu et al and Newton et al defined at-risk according to the method set out by Conrod et al¹⁶, which identifies students at-risk of substance use following a personality test. Four high risk personality types have been identified: sensation seeking, negative thinking, anxiety sensitivity and impulsivity. Mahu et al identified that only the intervention targeting sensation seeking was effective in reducing cannabis use.⁹ Whereas Newton et al found overall effectiveness for the personality-targeted interventions in reducing frequency of alcohol consumption, binge drinking and experience of alcohol-related harms.¹¹ Spoth's et al definition of higher risk students encompassed those students who had initiated substance use. They found that following the implementation of school-based program in combination with a family-based program lead to stronger intervention effects for substance initiation and cigarette use for these higher risk students, compared to normal-low risk students.¹³

Core components

Various critical components of effective interventions can be identified, including the use of computers in SBI, offering multiple sessions, providing skills training and development opportunities, and involving parents in the intervention. Other less critical components included providing recreational activities and health education, and linking in with other services.

Use of computers in SBI

While there was not enough evidence for the effectiveness of stand-alone computerised SBI, the majority of the effective SBI programs utilised computers or tablets in their delivery, either as a stand-alone or therapist-delivered SBI. Therapist used the computer or tablet to guide them through the Brief Intervention process. The computer program automatically personalised the feedback for the participant and thereby provided the therapist with directly relevant content of the intervention.

Offering multiple sessions

Apart from some SBI programs, the majority of the effective prevention and early intervention programs consisted of multiple sessions delivered over multiple weeks. The shortest program was two sessions with the longest program containing up to 19 sessions. Implementing multiple sessions has the benefits of repeating learned content, practising learned skills, and building relationships between facilitators and participants.

Skill training and development opportunities

Effective prevention and early intervention programs contained opportunities for skills training. Skills included in the various programs ranged from parenting skills, to drug refusal skills and conflict and problem-solving skills. In line with the previous component of offering multiple sessions, it was found to be effective to offer follow-up sessions in which participants had the opportunity to practice their learned skills in a facilitated environment.

Involving parents

The effective family interventions obviously including the involvement of parents in the intervention for the youth, however some effective SBI programs also included a parental component.⁵ Including parents of vulnerable youth is in line with a systems approach of prevention which stipulates that to effectively address problem behaviours, solutions should go beyond the individual, acknowledging the influence that

home life and other environment have on an individual, and moving away from an individualistic approach. This approach seems particularly appropriate for youth from cultures with a strong focus on family relationships, such as Indigenous cultures.

Discussion

Summary of evidence base

This Evidence Check assessed the evidence of effective prevention and early intervention to prevent and/or reduce substance use among vulnerable youth. Following the NHMRC evidence matrix (see Table 8), the evidence base of substance use prevention and early intervention for vulnerable youth is likely satisfactory to good with several Level I and II studies. However, despite the rigorous evidence-base, the consistency of the evidence is poor. For example, the outcomes of SBIRT evaluations showed mixed results, with some studies reporting positive findings for reductions in alcohol and cannabis use ^{5, 15}, whereas others did not. ⁵ ¹⁴ This was likely related to inconsistencies in the elements of the interventions being implement in SBIRT as well as other programs, such as mentoring. For example, only a few SBIRT programs contained referral to treatment (identified as an important contributor to effectiveness in the adult population), delivery by therapist or computer and the brief intervention component lasted only 10 minutes in some studies but up to 60 minutes in others. Furthermore, there were inconsistencies in the outcome measures used to evaluate the effectiveness of the programs ^{5, 6}. This complicates drawing strong conclusions about the effectiveness of the included prevention and early intervention programs.

Table 8 NHMRC summary of the evidence base (green highlights indicate findings of this rapid review)

Component	A	B	C	D
	Excellent	Good	Satisfactory	Poor
Evidence base (using hierarchy Table 1)	several level I or II studies with low risk of bias	one or two level II studies with low risk of bias or a systematic review or multiple level III studies with low risk of bias	level III studies with low risk of bias, or level I or II studies with moderate risk of bias	level IV studies, or level I to III studies with high risk of bias
Consistency	all studies consistent	most studies consistent and inconsistency may be explained	some inconsistency reflecting genuine uncertainty around clinical question	evidence is inconsistent
Clinical impact	very large	substantial	moderate	slight or restricted
Generalisability	population/s studied in body of evidence are the same as the target population in question	population/s studied in the body of evidence are similar to the target population in question	population/s studied in body of evidence differ to target population in question, but it is clinically sensible to apply this evidence to target population	population/s studied in body of evidence differ to target population and hard to judge whether it is sensible to generalise to target population
Applicability	directly applicable to Australian context	applicable to Australian context with few caveats	probably applicable to Australian context with some caveats	not applicable to Australian context

The clinical impact of the total evidence base is moderate with average effect sizes reported in most studies (which is common in public health interventions). The generalisability and applicability of the identified studies to the target population (vulnerable young people) in Australia is satisfactory to good. The majority (75%) of the studies were conducted in the US and only three in Australia. While US and Australian cultures have many similarities, US programs would probably require adaptation to the Australian context. For example, BI programs in the US included a focus on carrying weapons ^{14, 15}, or programs were targeted to Hispanic immigrants ¹², neither of which is directly applicable to Australia. However, when minor

adaptations are made, the programs may be applicable in Australia as was shown in the PREVENTURE study which adapted a UK program for implementation in Australia.¹¹

The most promising evidence was found for mentoring programs, brief intervention, family-based intervention and personality-targeted interventions as prevention and early intervention programs for vulnerable youth. However, the heterogeneity of outcome measures used and delivery of programs (except for personality-targeted interventions) complicate recommendations on these programs. More research is needed to identify the key elements of successful prevention and early intervention programs.

Limitations

It is important to note that this rapid review was not a comprehensive overview of all literature in this area. While care was taken in the development of the search strategy to identify a large range of studies, this was not a systematic review, so we might have missed evaluations and programs. Furthermore, as with any review, there is a possibility of a reporting bias in that positive findings are more likely published in peer reviewed journals than null findings. Searching the grey literature can address this problem to a certain extent but it is always possible that more studies with null findings were not published.

Furthermore, while this review assessed the quality of the evidence base by grouping studies together according to the NHMRC level of evidence, the methodological quality of each individual study was not assessed in detail. This study identified nine RCTs and two reviews of RCTs, but it is unclear how well these RCTs were conducted. A systematic review should appraise the studies' methodological quality by assessing issues such as the representativeness of the participants, the reliability and validity of measurement tools used, drop-out rates and whether confounding variables were taken into account.³⁰ This limited the full assessment of the quality of the evidence base of studies evaluating prevention and early intervention programs for vulnerable youth.

Conclusions and Recommendations

Following the findings of this review, the authors recommend NSW Ministry of Health and NSW Police to consider implementing the following prevention and early intervention programs for vulnerable youth:

- Personality-targeted prevention programs show promise in reducing alcohol and other drug use and have been trialled in Australia. While designed to be implemented within schools, the format of the program allows for implementation in other settings because it is not classroom-based.
- Mentoring programs are widely implemented, low cost and have been shown to reduce substance use and delinquency, both as prevention and early intervention programs.
- While more research is required for SBIRT for use with adolescents, it is likely to be an effective approach. There is promise in their delivery via tablet/computer or computerised delivery by therapist, or other workers in a juvenile justice setting if officers receive training.
- Family-based interventions might be recommended, but more evidence is needed for local Australian family-based intervention that are responsive to the local cultural context.
- Evidence-based school-based programs can potentially be adapted to vulnerable youth settings in close collaboration with youth in these settings. This is a potentially promising approach because there is a relatively strong evidence-base for school-based programs in the prevention of substance use.
- Furthermore, risk behaviours in young people rarely occur in isolation of each other, and there is some evidence suggesting interventions with a single-risk focus are not effective in the long-term at improving risk behaviours in young people.³¹⁻³³ A multifaceted approach to intervention and prevention should be considered. This could be achieved by taking a multi-component approach to intervention, through coordinated implementation of several of the more effective strategies identified in this review.

The authors also emphasise the need for more rigorous evaluations to grow the evidence base for prevention and early intervention programs for vulnerable young people, particularly for programs in Australia. The authors recommend the NSW Ministry of Health and NSW Police take an active role in supporting building this evidence base through the following recommendations:

- Support more rigorous evaluation. While the evidence-base of prevention and early intervention programs for vulnerable youth was classified as good to satisfactory in the NHMRC summary table (Table 8), most of the evidence comes from studies in the US. To test its applicability to the local context we need to conduct more rigorous studies in Australia.
- When adapting programs to the local context, ensure community participation in every step of the adaptation process to ensure that the adaptation is truly relatable to the new setting.
- Given the heterogeneity in the type of prevention and intervention activities available for vulnerable young people, agreement on the types of risk factors shared by vulnerable young people for certain risk behaviours, such as substance use, would be a useful first step in enabling identification and refinement of the most effective programs for this vulnerable group. Due to the limitations of current data available on adolescent risk factors however, this is a difficult task. Availability of timely, easily-accessible and accurate data on adolescent risk factors would improve the ability to refine definitions for vulnerable young people and facilitate the tailoring of prevention and intervention activities so

they can more accurately target the most serious risk factors experienced by young people. It would also increase the ability to draw direct comparisons about the effectiveness of different prevention and intervention activities on risk factors over time. This highlights the need for the development of consistent, adolescent-specific data collection systems that can be accessed by multiple agencies to develop coordinated, targeted and timely responses to risk behaviour.

- To ensure generalisability and comparability across different settings, an overarching standardised intervention model could be developed that operationalises each effective intervention in a standardised way while simultaneously tailoring the activities that operationalise each component to the resources and needs of communities.¹ Adoption of a standardised intervention model could also help standardise the outcome measures used to assess the impact of prevention and intervention activities, which would in turn help to build the evidence base for these programs.

In conclusion, this rapid review has identified prevention and intervention activities that could be effective at improving crime and substance use outcomes for vulnerable young people. However, the evidence regarding specific strategies for vulnerable young people is varied and there is no clear evidence for one solution over another. It seems that outcomes for vulnerable young people will most likely be improved if the evidence base for prevention and intervention activities for this group is improved, and this is most likely to be achieved through six key actions:

1. Strong, cross-agency collaboration and governance of prevention and intervention activities for vulnerable young people
2. Improving the availability of data on risk factors in young people through development of adolescent specific data collection systems
3. Using these data to more precisely define the risks experienced by vulnerable young people
4. Taking a comprehensive, multi-component approach to prevention and intervention of risk behaviours in vulnerable young people
5. Achieving greater consistency and comparability across interventions by reaching cross-agency agreement on a standardised definition for intervention and prevention activities
6. Standardising the outcomes and the outcome measures used to evaluate intervention effects.

References

1. Knight A, Shakeshaft A, Havard A, Maple M, Foley C, et al. The quality and effectiveness of interventions that target multiple risk factors among young people: A Systematic Review. Australian and New Zealand Journal of Public Health. 2016
2. Snijder M, Stapinski L, Lees B, Newton N, Champion K, et al. Protocol for a systematic review of substance use prevention programs for Indigenous adolescents in the United States of America, Canada, Australia and, New Zealand. JMIR Research Protocols. In Press
3. Doran C, Kinchin I, Bainbridge R, McCalman J, Shakeshaft A. Effectiveness of alcohol and other drug interventions in at-risk Aboriginal youth: an Evidence Check rapid review brokered by the Sax Institute for the NSW Ministry of Health. Sydney: Sax Institute; 2017.
4. Covidence. Covidence systematic review software. Melbourne, Australia: Veritas Health Innovation; 2017. [Access Date: 2017]. Available from: www.covidence.org
5. Mitchell SG, Gryczynski J, O'Grady KE, Schwartz RP. SBIRT for adolescent drug and alcohol use: current status and future directions. Journal of Substance Abuse Treatment. 2013;44(5):463-72.
6. Tolan P, Henry D, Schoeny M, Bass A, Lovegrove P, et al. Mentoring interventions to affect juvenile delinquency and associated problems: A systematic review. Campbell Systematic Reviews. 2013;9(10)
7. Guo X, Slesnick N. Reductions in hard drug use among homeless youth receiving a strength-based outreach intervention: comparing the long-term effects of shelter linkage versus drop-in center linkage. Substance Use and Misuse. 2017;52(7):905-15.
8. Komro KA, Livingston MD, Wagenaar AC, Kominsky TK, Pettigrew DW, et al. Multilevel Prevention Trial of Alcohol Use Among American Indian and White High School Students in the Cherokee Nation. American Journal of Public Health. 2017;107(3):453-59.
9. Mahu IT, Doucet C, O'Leary-Barrett M, Conrod PJ. Can cannabis use be prevented by targeting personality risk in schools? Twenty-four-month outcome of the adventure trial on cannabis use: a cluster-randomized controlled trial. Addiction (Abingdon, England). 2015;110(10):1625-33.
10. Milburn NG, Iribarren FJ, Rice E, Lightfoot M, Solorio R, et al. A family intervention to reduce sexual risk behavior, substance use, and delinquency among newly homeless youth. Journal of Adolescent Health. 2012;50(4):358-64.
11. Newton NC, Conrod PJ, Slade T, Carragher N, Champion KE, et al. The long-term effectiveness of a selective, personality-targeted prevention program in reducing alcohol use and related harms: a cluster randomized controlled trial. Journal of Child Psychology and Psychiatry and Allied Disciplines. 2016;57(9):1056-65.
12. Pantin H, Prado G, Lopez B, Huang S, Tapia MI, et al. A randomized controlled trial of Familias Unidas for Hispanic adolescents with behavior problems. Psychosomatic Medicine. 2009;71(9):987-95.
13. Spoth R, Redmond C, Shin C, Greenberg M, Clair S, et al. Substance-Use Outcomes at 18 Months Past Baseline. The PROSPER Community-University Partnership Trial. American Journal of Preventive Medicine. 2007;32(5):395-402.
14. Walton MA, Resko S, Barry KL, Chermack ST, Zucker RA, et al. A randomized controlled trial testing the efficacy of a brief cannabis universal prevention program among adolescents in primary care. Addiction. 2014;109(5):786-97.
15. Walton MA, Chermack ST, Shope JT, Bingham CR, Zimmerman MA, et al. Effects of a brief intervention for reducing violence and alcohol misuse among adolescents: A randomized controlled trial. Journal of the American Medical Association. 2010;304(5):527-35.
16. Conrod PJ, Castellanos-Ryan N, Strang J. Brief, personality-targeted coping skills interventions and survival as a non-drug user over a 2-year period during adolescence. Archives of General Psychiatry. 2010;67(1):85-93.
17. Harris SK, Csémy L, Sherritt L, Starostova O, Van Hook S, et al. Computer-facilitated substance use screening and brief advice for teens in primary care: An international trial. Pediatrics. 2012;129(6):1072-82.
18. Ho KM, Litton E, Geelhoed E, Gope M, Burrell M, et al. Effect of an injury awareness education program on risk-taking behaviors and injuries in juvenile justice offenders: a retrospective cohort study. PloS one. 2012;7(2):e31776.

19. Holleran Steiker LK, Hopson LM, Goldbach JT, Robinson C. Evidence for site-specific, systematic adaptation of substance prevention curriculum with high-risk youths in community and alternative school settings. *Journal of Child & Adolescent Substance Abuse*. 2014;23(5):307-17.
20. Wiggins M, Bonell C, Sawtell M, Austerberry H, Burchett H, et al. Health outcomes of youth development programme in England: prospective matched comparison study. *BMJ*. 2009;339:b2534.
21. Feinberg ME, Jones D, Greenberg MT, Osgood DW, Bontempo D. Effects of the communities that care model in Pennsylvania on change in adolescent risk and problem behaviors. *Prevention Science*. 2010;11(2):163-71.
22. Dembo R, Briones-Robinson R, Ungaro R, Barrett K, Gullledge L, et al. Brief intervention for truant youth sexual risk behavior and alcohol use: a parallel process growth model analysis. *Journal of Child & Adolescent Substance Abuse*. 2014;23(3):155-68.
23. Dembo R, Briones-Robinson R, Wareham J, Schmeidler J, Winters KC, et al. Impact of Brief Intervention Services on Drug-Using, Truant Youth Arrest Charges Over Time. *Journal of Child & Adolescent Substance Abuse*. 2014;23(6):375-88.
24. Dembo R, Schmeidler J, Wareham J, Briones-Robinson R, Winters KC, et al. Impact of brief intervention services on drug-using truant youths' self-reported delinquency and arrest charges: a longitudinal study. *Journal of Child & Adolescent Substance Abuse*. 2016;25(5):458-79.
25. Brown WN, D'Errico E, Morrell HE. The Youth Alternative Solutions Program: Evaluating a hospital-based intervention for adolescent substance use. *Journal of Addictions Nursing*. 2015;26(1):32-40.
26. Hiller ML, Malluche D, Bryan V, DuPont ML, Martin B, et al. A multisite description of juvenile drug courts program models and during-program outcomes. *International Journal of Offender Therapy and Comparative Criminology*. 2010;54(2):213-35.
27. Lee KS, Conigrave KM, Clough AR, Wallace C, Silins E, et al. Evaluation of a community-driven preventive youth initiative in Arnhem Land, Northern Territory, Australia. *Drug and Alcohol Review*. 2008;27(1):75-82.
28. Patchell BA, Robbins LK, Lowe JA, Hoke MM. The effect of a culturally tailored substance abuse prevention intervention with Plains Indian adolescents. *Journal of Cultural Diversity*. 2015;22(1):3-8.
29. Mullen J, Ryan SR, Mathias CW, Dougherty DM. Feasibility of a computer-assisted alcohol screening, brief intervention and referral to treatment program for DWI offenders. *Addiction Science & Clinical Practice*. 2015;10(1):25.
30. Armijo-Olivo S, Stiles CR, Hagen NA, Biondo PD, Cummings GG. Assessment of study quality for systematic reviews: a comparison of the Cochrane Collaboration Risk of Bias Tool and the Effective Public Health Practice Project Quality Assessment Tool: methodological research. *Journal of Evaluation in Clinical Practice*. 2012;18(1):12-18.
31. Calabria B, Shakeshaft AP, Havard A. A systematic and methodological review of interventions for young people experiencing alcohol-related harm. *Addiction*. 2011;106(8):1406-18.
32. Best D, Manning V, Gossop M, Gross S, Strang J. Excessive drinking and other problem behaviours among 14–16 year old schoolchildren. *Addictive Behaviors*. 2006;31(8):1424-35.
33. Stockings E, Degenhardt L, Dobbins T, Lee Y, Erskine H, et al. Preventing depression and anxiety in young people: a review of the joint efficacy of universal, selective and indicated prevention. *Psychological Medicine*. 2016;46(1):11-26.

Appendix A — Definition of vulnerable young people

Included in the definition of 'vulnerable' are the following population groups:

- Are economically disadvantaged or live in low-income households
- Are Aboriginal and/or Torres Strait Islander
- Are homeless or at risk of homelessness
- Are sexually or gender diverse (LGBTI)
- Are entering, in, or exiting out-of-home care
- Are in contact with the criminal justice system including police
- Are refugees or newly arrived migrants
- Are young carers
- Have experienced family, domestic, intimate partner or peer violence
- Have physical or intellectual disabilities
- Have chronic or complex conditions, including mental health disorders
- Live in rural and remote areas (or low-ranking areas of the SEIFA index of advantage)
- Are pregnant or parenting
- Engage in early onset of drug use (aged 12–17 years old).

Appendix B — Table including all studies

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Level I – Systematic reviews of randomised controlled trials					
Mitchell, 2013, UK and US ⁵	Review the existent literature and strength of the evidence of the use of SBIRT in adolescents	Adolescents aged 14 –17 years old, studies conducted in the US and Great Britain	Systematic review of Randomised Controlled Trials	In Screening Brief Intervention and Referral to Treatment (SBIRT) adolescents are first screened using validated tools, those who are at risk of substance misuse receive a brief intervention (ranging from 15 min to more than 60 min). The BI is provided by trained professionals, peers or computerised delivery often using motivational interviewing strategies	15 RCTs of SBIRT, 1 in primary care setting, 6 ED setting, 6 in school-setting, 2 in community setting. The primary care setting identified a reduction in marijuana use among intervention participants relative to control, but not for alcohol use. ED studies did not find reductions in binge drinking in intervention relative to controls. 1 ED study found reduction in marijuana use amongst intervention relative to controls. Mixed findings for school setting, with 2 studies finding significant reductions in self-reported substance use (one of which involved parents in the BI), the other 4 studies did not find changes in substance use in the intervention group relative to controls. One community-based BI RCT did not find any differences between the intervention and control group. The other community-based study with homeless youth found reduction in illicit drug use amongst intervention participants, but no reductions in marijuana or alcohol use.
Tolan, 2013, US and other countries ⁶	To systematically review the evidence on the effects of mentoring interventions for delinquency and related problems of aggression, drug use and school failure	146 studies of mentoring, 46 included in quantitative analysis. 27 RCTs and 19 quasi-experimental studies. 25 studies targeting delinquency related outcomes, 6 studies targeting drug use outcomes	Systematic review of RCTs and quasi-experimental studies	Mentoring interventions involve a mentor-mentee relationship of usual an older person and a young person who build a relationship and interact of an extended period. The older person has greater share of knowledge experience and power, which they can use to support the mentee and be a positive influence. The authors searched scientific databases and research registers and reference lists of primary studies and reviews. Authors conducted an inverse-variance meta-analysis	The outcomes of the studies were statistically significant and positive for each outcome, with average effect-sizes for all four outcomes: Delinquency $r = 0.21$; Drug use $r = 0.16$; Aggression $r = 0.29$; Academic achievement $r = 0.11$

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
				with a random-effects model to calculate the effect size of the impact of mentoring on the four outcomes	
Level II – Randomised controlled trials					
Guo, 2017 US ⁷	To evaluate a strengths-based outreach and advocacy intervention for young people at homeless shelters versus drop-in centres in reducing illicit drug use.	79 Homeless youth (14–24 years old) recruited via outreach from soup kitchens, parks, libraries, and other locations. Interventions were delivered in either drop-in centres (n = 40) or crisis shelters (n = 39).	Randomised controlled trial	<p>Participants were randomly assigned to receive crisis shelter linkage or drop-in centre linkage.</p> <p>Crisis-shelter linkage: The crisis-shelter was dedicated for youth aged <18 and open 24/7 and provided temporary overnight accommodation to meet basic needs with the aim of family reunification.</p> <p>Drop-in centre linkage: The drop-in centre was dedicated for homeless young people aged 14–24 years old and provided food, laundry and shower facilities as well as recreational activities. Drop-in staff additionally linked youth to community resources to support their engagement with services such as counselling and housing programs.</p>	Both groups of youths had reductions in the odds of illicit drug use (including heroin, amphetamines, cocaine and inhalants) from baseline to 9-month follow-up, with greater reductions in the drop-in centre linkage group.
Komro, 2017, US ⁸	To evaluate the effectiveness of a multilevel intervention designed to prevent underage alcohol use among youths living in the Cherokee Nation.	6 communities with high percentage of American Indians (n=692; aged 14–18 years old): 2 CONNECT intervention (n=118); Communities Mobilizing for Change on Alcohol (CMCA; n=141) and combined condition (n=433)	Randomised controlled trial	This project implemented both the Communities mobilizing for change on alcohol (CMCA) and the CONNECT school interventions. CMCA uses community-organizing strategies to galvanize adults to take actions to reduce youths' access to alcohol through social and commercial sources (the CMCA manual is available at tinyurl.com/CMCA-CONNECT). CONNECT consists of 12 one-on-one health consultations over a period of three years and includes alcohol and normative education,	Students exposed to CMCA showed a significant reduction in the probability over time of 30-day alcohol use (25%) and heavy episodic drinking (24%) compared with students in the control condition. Students exposed to CONNECT showed significantly lower likelihood of consuming alcohol compared to the control group. A combination of both interventions was less effective than both interventions stand alone.

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
				personal goal development and healthy alternatives.	
Mahu, 2015, UK ⁹	To examine the effectiveness of a personality-targeted intervention program (Adventure trial) delivered by trained teachers to vulnerable high-school students on reducing marijuana use and frequency of use.	Twenty-one secondary schools were randomized to intervention (n=12) or control (n=9) conditions, encompassing a total of 1038 HR students in the ninth grade (average 13.7 years old)	Cluster randomised controlled trial	Brief personality-targeted interventions (2 x 90min sessions) were administered to students with one of four high risk profiles: anxiety sensitivity, hopelessness, impulsivity and sensation-seeking.	Significant intervention effects on cannabis use rates at the 6-month follow-up in the intent-to-treat sample and significant reductions in frequency of use at 12- and 18-month follow-up, but this was not supported in two-part latent growth models. Subgroup analyses (both logistic and two-part models) reveal that the sensation-seeking intervention delayed the onset of cannabis use among sensation seekers
Milburn, 2012, US ¹⁰	To evaluate the efficacy of a short family intervention in reducing sexual risk behaviour, drug use, and delinquent behaviours among homeless youth.	151 families with a homeless adolescent aged 12–17 years old were recruited from diverse sites in Southern California.	Randomised controlled trial	The STRIVE intervention consisted of five sessions administered to the youth and parent(s) together by a trained facilitator. The session content was based on cognitive-behavioural theories, designed to improve families' problem-solving and conflict resolution skills.	Sexual risk behaviour, alcohol use, illicit drug use, and delinquent behaviours decreased significantly more during 12 months in the intervention condition compared with the control condition. Marijuana use, however, significantly increased in the intervention condition compared with the control condition
Newton, 2016, Australia ¹¹	Evaluate the long-term impact of an intervention targeting personality risks for substance use	438 students (aged 13–14 years old) categorized as high risk. 236 in intervention group; 202 in control group. Recruited in schools around Australia	Four-arm cluster randomised controlled trial	The PREVENTURE intervention was delivered in two 90-minute group sessions, 1 week apart by a certified facilitator and co-facilitator. The program includes psychoeducational strategies, specified for each personality trait. It includes exploring cognitive behavioural strategies that youth cope with issues and to challenge these coping strategies. Self-report measure at baseline, 12, 24 and 36 month follow-up. Measures included frequency of drinking, binge drinking and experience of alcohol related harms	Relative to controls, students who received the PREVENTURE program had a significantly reduced growth over time in frequency of consuming alcohol, binge drinking and the experience of alcohol-related harms.
Pantin 2009, US ¹²	Evaluate the effectiveness of the Familias Unidas	227 Hispanic adolescents average age of 13.8 years old with mild behavioural	Randomised controlled trial	Familias Unidas is an intervention that works with immigrant parents to provide them with knowledge and skills to raise their children in	Relative to controls, adolescents receiving the interventions experienced significantly less increase in substance use at follow-up points compared the

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
	intervention with adolescents with behavioural problems on their substance use, sexual behaviours, externalising disorder and family functioning	problems and their primary carer. 109 in intervention group, 104 in control group. Participants recruited via school counsellor who identified students with behavioural problems using the Revised Behaviour Problem Checklist		the US. Trained facilitators work with parents to acquire these skills in 9 1-hour group sessions and use these skills with their children in 10 1-hour home visits. Four 1-hour booster sessions at 10, 16 and 22 months. Parents and adolescents completed computerised assessment of substance use and other behaviours in English or Spanish at baseline, 6, 18 and 30 months follow-up.	baseline. There were no significant differences between control and Familias Unidas participants in the change in externalising behaviour disorder. Relative to controls, adolescents in the Familias Unidas intervention did not differ in their frequency of sexual intercourse, but did report significantly more condom use. Families in the Familias Unidas intervention reported significantly greater improvements in family functioning compared to control condition. Further analyses indicated that improved family functioning was a mediating factor on the intervention effect on substance use and condom use.
Spoth 2007, US ¹³	Examine a partnership-based family and school intervention effects on initiation, past-month and past-year substance use. And whether higher-risk (i.e. those who started using substances) students showed stronger intervention effects	28 school districts, 12,022 6th and 7th grade (11–14 years old) students and families; 6,091 in intervention, 5,931 in control. Community setting with family-based intervention and school-base intervention components	Randomised controlled trial	Intervention: Community teams chose family-based intervention (strengthening Families Program) and school-based intervention (Project Alert, Life Skills Training and All Stars) Control and Intervention students completed self-report surveys at baseline and 18 months	Relative to controls, intervention participants had lower AOD initiation rates, lower new-user rates of marijuana methamphetamine, ecstasy and inhalants and lower rates of past-year use of marijuana and inhalants. Higher-risk students showed stronger intervention effects for AOD initiation and past-month cigarette use.
Walton, 2010, US ¹⁵	Examine the effectiveness of therapist or computer brief intervention on violence and alcohol use	726 vulnerable youth (experience of alcohol use and violence in past year) aged 14–18 years old (63% African American or Hispanic); 237 in computer brief intervention; 254 in therapist brief intervention and 235 in control group. Participants recruited, screened and received intervention at Emergency Department	Randomised controlled trial	Computerised: stand-alone interactive animated program. Therapist: facilitated by tablet laptop computer displaying tailored feedback for participants. Self-report measures at baseline, 3- and 6-month follow-up	Relative to controls, participants in therapist brief intervention were less likely to report severe peer aggression, any peer aggression and violence consequences at 3 months. Relative to controls, computer and therapist intervention participants were less likely to experience more than 2 consequences of alcohol consumption at 6 months. No significant findings for alcohol misuse or binge drinking were reported.

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Walton, 2014, US ¹⁴	Prevent or delay initiation of cannabis use and reduce the extent of involvement with cannabis use, alcohol use, other drug use and delinquency using computerised or therapist brief intervention	714 youth aged 12–18 years old (73% African American or Hispanic); 233 in therapist brief intervention, 247 in computerised brief intervention and 234 in control. Participants recruited and received intervention in health clinics	Randomised controlled trial	Therapist brief intervention: therapist trained in motivational interviewing, followed content from computer screen Computerised brief intervention: self-completed by participant with buddy Control: received information flyer about Cannabis Baseline, 3, 6 and 12 months self-report measures of cannabis and AOD use and delinquency	Relative to controls, therapist brief intervention participants showed less other drug use and delinquency at 3 months and alcohol use at 6 months. Relative to controls, computerised brief intervention participants show less cannabis use at 3 and 6 months and other drug use at 3 months.
Level III-1 pseudo-randomised controlled trials					
Level III-2 comparative studies with concurrent controls					
Harris, 2012 US ¹⁷	To evaluate a computer-facilitated screening and brief advice system to screen for substance use in adolescents.	2096 12–18 years old attending 9 primary care offices in New England, US.	Quasi-experimental asynchronous design	The CRAFFT screening interview was used to identify lifetime and 12-month substance use for all patients attending the practice, producing an overall score and risk level for each patient (low, medium, high). All patients then viewed 10 pages of scientific information and true-life stories illustrating the health risks of substance use. GPs received a prompt, and 6-10 talking points to generate a conversation about substance use during their consultation.	Compared to treatment as usual, patients receiving the brief screening and advice reported lower rates of any substance use at 3- and 12-month follow-ups. This included lower rates of 3-month (15.5% vs 22.9% and 12-month alcohol use (29.3% vs. 37.5%).
Ho, 2012a and Ho 2012b Australia ¹⁸	To evaluate a 1-day youth injury awareness education program on risk taking behaviour, traffic or violence-related offences and alcohol or drug-related offences among juvenile justice offenders.	225 juvenile justice offenders in Western Australia aged 16–17 years old convicted by court magistrates between 2006 and 2010, who received the 1-day brief intervention.	Retrospective cohort study of program attendees vs. non-attendees	PARTY (Prevent Alcohol and Risk-related Trauma in Youth) is a one-day youth injury prevention program developed in Canada. It provides information to young people about injury-producing situations, and aims to assist in making informed prevention-oriented choices and adopting behaviours to minimise the risk of injuries. Participants receive talks on pre-hospital care and the vulnerability of the brain, and visit the emergency department, intensive care unit and trauma wards of a local hospital. Participants are shown when and why serious injury is likely to occur	Significant declines were identified for those attending the program vs. those who did not on: traffic or violence-related offences (3.6%, vs 26.8%), injuries leading to hospitalisation (0% vs 1.6%), and alcohol or drug-related offences (0% vs 2.4%). Estimated costs: <ul style="list-style-type: none"> • Per offence prevented: \$3,124 • Per serious injury avoided: \$42,169 • Per discounted life year gained: \$17,910.

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
Holleran, 2014, US ¹⁹	To adapt the Keepin' it Real (KiR) intervention to local youth's culture and evaluate its effectiveness in reducing/prevention of substance use and acceptance, compared the unadapted KiR and a comparison group	A total of 222 youth aged 14–19 years old enrolled in the study. Study sites included alternative schools, homeless youth shelter, juvenile justice day program, YMCA-run program for low-income youths, drop-in centre for LGBTQ youth and a youth advocacy group on the Texas-Mexico border. Analyses were conducted with 73 students who completed all questionnaires	Pretest and follow-up design with non-randomly assigned comparison groups	The KiR curriculum was adapted to fit non-school settings, which included shortening the sessions to a 6-week program and including videos and stories that resonate more with the higher-risk youth. KiR aims to develop drug resistance strategies. One group received the adapted KiR, second group received the unadapted KiR and third group was a comparison group. Measures: participant self-report of past month use of beer, wine, liquor and marijuana and acceptance of beer, wine, liquor and marijuana when offered. Measures at baseline, post-test and 6 week follow-up	Comparison participants' acceptance of substances went up over the follow-up periods, acceptance of substances among unadapted KiR participants went down at post-test, but increased again at follow-up. Substance acceptance went down at post-test and follow-up among adapted KiR participants. Both the adapted and unadapted KiR participants show greater reductions in substance use than the comparison group, however the adapted KiR participants showed greater reductions than the unadapted KiR participants.
Wiggins, 2009, UK ²⁰	Report on sexual health, substance use, truancy and offending outcomes of a youth development intervention in England	2,724 youth aged 13–15 years old at risk of school dropout, substance use or teenage pregnancy attending services; 1,637 in YPDP and 1,087 in comparison sites. Participants recruited at program site, or nearby.	Prospective matched cluster comparison pre-post	Youth People's Development Programme (YPDP) offering a combination of education, training/employment opportunities, health education (primarily sexual health and substance use), arts, sports and advice on accessing services. Self-report surveys measuring sexual health, substance use, mental health, school outcomes and offending. Measured at baseline, 1 and 2 years later.	No significant differences in substance use outcomes between YPDP participants and comparison group. No significant differences in offending outcomes between YPDP participants and comparison group.
Level III-3 Comparative studies without concurrent controls					
Dembo, 2014, US ²²	Interim findings from an experimental study involving truant youths with a maximum of two offences to determine whether alcohol use and sexual risk behaviours were longitudinally related, to examine the effects of the BI on alcohol use and sexual risk behaviours, to	200 truant youth at baseline, 107 truant youth at 12-month follow-up, aged 11–17 years old (mean 14.79 years); 65% male; thirty-eight percent of the youths were Caucasian; 26% were African-American; 28% were Hispanic; 2% were Asian; and 7% were from other, mainly multiethnic, backgrounds. The main place of recruitment into the BI	Experimental design	BI therapist sessions to promote abstinence and prevent relapse among drug-using adolescents through the development of adaptive beliefs and problem-solving skills. The BI incorporates elements of rational-emotive therapy (RET) and problem-solving therapy (PST) to develop adaptive beliefs and coping skills. Measured at baseline, 3-, 6-, and 12-month follow-up.	Youth who were more involved in alcohol use at baseline were significantly more likely to report a greater level of involvement in sexual risk behaviour. No support that the BI treatment would reduce alcohol use and sexual risk behaviours over the follow-up year among the truant youths.

First author, year, country	Objective	Sample size, setting	Design	Intervention/methods	Findings
	identify subgroups of youths involved in alcohol use and sexual risk behaviours, and to assess the impact of the BI on these subgroups.	project occurred at the Hillsborough County Juvenile Assessment Center, TIC. In addition, eligible participants were recruited from a community diversion program, as well as social worker or guidance counsellor referrals			
Dembo, 2014, US ²³	To describe the impact of BI services on official arrest charges for the truant youths over a 12-month, post-intervention follow-up period.	Primary recruitment occurred at a truancy centre and a community diversion program, and referrals from any social worker or guidance counsellor associated with the school district. Eligible youths were aged 11–17 years old; no official record of delinquency or up to two misdemeanour arrests; substance use; and live in region. 180 youths enrolled in the truancy intervention project between 2007–2010. A total of 65% were male, and averaged 14.79 years in age. Thirty-nine percent of the youths were Caucasian, 23% African-American, 28% Hispanic, 2% Asian, and 8% were from ethnic backgrounds	Experimental design	BI therapist sessions to promote abstinence and prevent relapse among drug-using adolescents through the development of adaptive beliefs and problem-solving skills. The BI incorporates elements of rational-emotive therapy (RET) and problem-solving therapy (PST) to develop adaptive beliefs and coping skills. Measured at baseline, 3-, 6-, and 12-month follow-up. Follow-up data included juvenile and adult arrests, time in a secure justice system or treatment facility, since the 12 months following their date of last participation in the intervention.	After controlling for the predictor variables, youths receiving BI had a near significant, lower rate of arrest charges during the third follow-up period (i.e., months 7 through 12). As such, the BI was found to be marginally significant in effecting future delinquency among truants, compared to the standard truancy program.
Dembo, 2016, US ²⁴	To describe the impact of BI services on the youths' self-reported delinquency over an 18-month follow-up period and of arrest charges	The main place of recruitment into the BI project occurred at a school-based south Florida Juvenile Assessment Center, or Truancy Intake Center (TIC). Eligible youths were aged 11–17 years old; no official record	Experimental design	BI therapist sessions to promote abstinence and prevent relapse among drug-using adolescents through the development of adaptive beliefs and problem-solving skills. The BI incorporates elements of rational-emotive therapy (RET) and problem-solving therapy (PST) to develop adaptive beliefs and	A number of significant BI intervention effects with sizable effect sizes were found, as well as a number of marginally significant BI effects. In particular, significant reductions in arrest charges at 24-month follow-up for youths receiving BI services compared to controls were among the key findings of this study.

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	over a 24-month follow-up period.	of delinquency or up to two misdemeanour arrests; substance use; and live in region. A total of 753 were eligible and 300 agreed to participate in the baseline interviews. Completion of follow-up interviews depended on when youths entered the project: 3-month (N=282), 6-month (N=281), 12-month (N=245), and 18-month (N=215) follow-up interviews.		coping skills. Measured at baseline, 3-, 6-, and 12-, 18- and 24-month follow-up. Follow-up data included juvenile and adult arrests, time in a secure justice system or treatment facility, since the 12-24 months following their date of last participation in the intervention.	
Feinberg, 2010, US ²¹	Researchers conducted a longitudinal study of Communities That Care (CTC) program (which uses evidence-based prevention to reduce risk factors and increase protective factors) in Pennsylvania utilizing biannual surveillance data collected through anonymous in-school student surveys.	A total of 59,725 surveys have been completed from 2001-2005. The school districts in the combined 2001-2005 sample had an average of 7.2% of households below the poverty line (SD=3.8); and an average of 16.1% single-parent female-headed households (SD=7.2). Apart from two major metropolitan regions, Pennsylvania is largely composed of rural areas, and small towns and cities and is predominantly white. There was little participation in PAYS among the main school district in each of the two major metropolitan areas.	Experimental design	CTC involves the formation of collaborative community partnerships among community stakeholders to spearhead adoption and support of EBPs that have been shown to reduce risk and enhance protective factors for adolescent behaviour problems (e.g., substance use, delinquency, violence, school drop-out). The Pennsylvania Youth Survey (PAYS) was collected in 2001, 2003 and 2005. The student self-report measure utilised for the PAYS is the CTC Youth Survey, which assesses risk and protective factors for adolescent ATOD and delinquency and has been well-validated.	Youth in CTC communities demonstrated less growth in delinquency, but not substance use, than youth in non-CTC communities. Levels of risk factors increased more slowly, and protective factors and academic performance decreased more slowly, among CTC community grade-cohorts that were exposed to evidence-based, universal prevention programs than comparison grade cohorts. Community coalitions can affect adolescent risk and protective behaviours at a population level when evidence-based programs are utilised.
Level IV Case series with either post-test or pre-test/post-test outcomes					
Brown, 2015 US ²⁵	To evaluate the effectiveness of a hospital-based	27 adolescents (29,6%female) aged 13–19 years old (mean age 16.7). The Youth Alternative Solutions Program	Pre-post	A single program facilitator employed by the hospital's trauma support services centre delivered all components of the program. The program consisted of seven distinct	Significant increase in negative alcohol expectancies from pre-test to 3-month follow-up

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	adolescent substance use intervention program.	(YASP) is a Hospital based intervention. Participants spent, on average, 6 to 8 weeks actively participating in the YASP intervention.		components delivered over the course of eight weekly sessions, including (a) program orientation; (b) a one-on-one entrance interview with the program facilitator that included a needs assessment and baseline drug test; (c) two workshops focusing on the physiological effects of SU, positive behavioural choices, and healthier coping skills; (d) a presentation at the county Coroner's office; (e) emergency department and inpatient trauma unit visits lead by frontline nurses; (f) attending an approved 12-step program meeting; and (g) an exit interview to ensure completion of all required program components and a final drug test.	
Hiller, 2008 US ²⁶	To evaluate the effectiveness of three juvenile drug courts	65 13 to 17-year-olds attending one of 3 juvenile drug courts in the US (Program 1: n = 28; Program 2: n = 26; Program 3 n = 11).	Retrospective file review; drug court staff interviews; focus groups	<p>Three juvenile drug court programs of 9, 10 and 12-months duration (program capacity ranged from 15-25 people), each with 3 phases in which the number of treatment sessions, weekly drug screens and drug court sessions gradually decrease over time.</p> <p>Each drug court targeted drug-and alcohol-involved youth (boys and girls) aged 13– 17 years old at various stages of the judicial process, including post-adjudicated, committed, on probation and re-entry.</p> <p>All courts provided inpatient or outpatient intensive substance abuse treatment services (either in-house or via referral to a local treatment agency), case management by drug court staff, random urine drug testing with sanctions for positive screens (including curfew restriction, home incarceration with</p>	<p>Arrests: 22% of youth received new criminal charges on the program, 5% received new felony charges and 17% received a new misdemeanour charge.</p> <p>Drug use: 17% of youth did not test positive for drugs during the 12-month evaluation period. Of those with a positive drug screen, most were positive for marijuana (78%), followed by cocaine (20%) and opioids (12%).</p> <p>Retention in drug courts: 69% of participants remained involved in the courts, 10% graduated and 21% were discharged for various reasons, including non-compliance, absconding or transfers.</p>

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				monitoring, community service, book reports and short periods in goal.	
Lee, 2008, Australia ²⁷	To examine the role, methods and probable effectiveness of a community-driven youth preventive initiative, the Youth Development Unit ('the Unit') in reducing the risk of substance misuse and increasing resilience and connectedness in a group of Indigenous communities in Arnhem Land (NT)	Data included community, staff and stakeholder interviews and observation. Aboriginal community-based youth.	Qualitative and quantitative measures were used to assess acceptability and effectiveness in the initiative's first 2 years of operation (June 2003 – June 2005).	Community run intervention focussing on cultural enhancement, education and recreational activities	Interviewees reported increased youth training and recreational opportunities, increased communication between local agencies, overall satisfaction with programme delivery and optimism that it could achieve its goals. Comparing the 2 years before and after the Unit's implementation, there were no significant changes in school attendance (55.9% versus 51.3%) or youth apprehensions (68 versus 75).
Patchell, 2015, US ²⁸	Examine the impact of a tribal-specific substance abuse prevention for vulnerable Native American Indian adolescents on self-reliance and substance use	44 vulnerable Native American Indian adolescents, aged 16–18 years old. Adolescents were recruited in schools with help from school counsellor to identify vulnerable adolescents (those who are vulnerable of substance abuse)	One group pre-post-test study	Native Talking Circle Intervention (NTCI) consisted of a 30–45 group session, 2–3 times per week over an 8.5-week period, led by a Native American facilitator of the same tribe. Topics discussed in the NTCI included being responsible (includes drug and alcohol education and how to recognize problems and vulnerable situations), being disciplined and being confident. Self-report surveys at baseline and directly post-intervention including Cherokee Self-Reliance Questionnaire and Substance Problems Scale.	There were significant positive changes at follow-up compared to baseline. There was a significant reduction in substance use/abuse at follow-up compared to baseline