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Abstract | This study reviews benefit–cost analyses of programs designed to reduce demand for illicit drugs. Data were synthesised from 67 benefit–cost analyses of prevention, law enforcement and treatment programs. Eighty percent of the 70 separate benefit–cost ratios exceeded 1.0, indicating that savings outweighed costs among most programs reviewed. Benefit–cost ratios ranged from −18.20 to 63.32, varying substantially for different program types and populations. On average, demand reduction programs produced a return on investment of $5.40 for every dollar spent. These findings suggest demand reduction programs are generally economical.

What are the monetary returns of investing in programs that reduce demand for illicit drugs?

Alexandra Voce and Tom Sullivan

Illicit drug use places a significant burden on the Australian economy. The use of illicit drugs is associated with increased costs to the criminal justice system (CJS; eg courts, prisons), victims of crime and the healthcare system (eg hospital visits, treatment, GP visits); reduced individual productivity (eg loss of income and employment); and broader consequences for families and communities (eg child maltreatment, road traffic accidents; Australian Institute of Health and Welfare 2020; Degenhardt & Hall 2012; Longo, Cooke & Weir 2020). While it is difficult to estimate the total cost of illicit drug use in Australia, researchers have estimated substantial annual costs for the use of methamphetamine ($5b), illegal and non-prescription opioids ($15.8b) and cannabis ($4.5b; Tait & Allsop 2020a, 2020b, 2016).

To combat illicit drug use and reduce the harmful effects of alcohol and tobacco, the Australian Government established the National Drug Strategy 2017–2026, comprising three pillars of harm minimisation: demand reduction, supply reduction and harm reduction (Department of Health 2017).

The most extensively researched and evidence-based pillar is demand reduction (Ritter et al. 2014). Demand reduction aims to prevent the uptake or delay the onset of illicit drug use, reduce illicit drug use in the community, and support people to recover from dependence through treatment (Department of Health 2017). Demand reduction encompasses a range of approaches including prevention, treatment and law enforcement strategies (Ritter & McDonald 2005). Prevention programs seek to prevent the uptake or escalation of drug use among the general population (universal programs) or among populations at higher risk of illicit drug use or dependence. In contrast, treatment programs target further illicit drug use among those who are dependent drug users. Finally, diversionary law enforcement strategies include drug court programs, in which drug-dependent offenders are provided with rehabilitation and treatment instead of standard sentences. The distinction between demand reduction and supply reduction strategies is often blurred (Mazerolle, Soole & Rombouts 2007). Law enforcement and border control activities (eg supplier arrests, drug seizures) seeking to influence the market price of illicit drugs can also reduce demand, but these strategies are often classified as supply reduction measures as this is their general aim (Mazerolle, Soole & Rombouts 2007; Pollack & Reuter 2014; Smithson et al. 2003; Wan et al. 2014).

Extensive evidence from Australia and overseas indicates that demand reduction programs, particularly treatment services, are generally effective in reducing illicit drug use, improving physical and psychological health, reducing engagement in criminal activity, and encouraging reintegration and participation in the community (Ettner et al. 2006). Yet the cost of implementing and maintaining demand reduction programs is substantial. Estimates suggest that the Australian Government invests approximately $1b per annum in substance use treatment (Ritter et al. 2014).

Benefit–cost analysis (BCA) is one way to identify effective and cost-efficient programs that reduce and prevent illicit drug use. BCA is a systematic approach to estimating and comparing the costs and benefits of different alternatives to determine which option is the most cost-effective while also achieving effective results (Chisholm 2000). In the context of demand reduction programs, BCA involves assigning values to changes in outcomes produced by different programs and comparing these benefits to the costs of providing the programs. A key strength of BCA is that this framework can account for both the tangible (monetary) impacts and the intangible (non-monetary) impacts of a program, and combines this information into a single common metric. Intangible costs are the emotional or physical burden placed on individuals by drug-induced problems (addiction, premature mortality, or fear of crime and victimisation; Pacula et al. 2009). The result can be expressed as a benefit–cost ratio (BCR; ie benefit divided by cost) or a net benefit (ie cost subtracted from benefit). An intervention is considered cost-beneficial if the BCR exceeds 1.0 (eg 10:1 ratio of benefits to costs) or if the net benefit is positive. Importantly, ‘costs’ are any negative impact of the program (eg detriments to wellbeing), not merely monetary expenses.

Aim

The aim of this study is to estimate the return on investment for demand reduction strategies targeting illicit drug use. We reviewed the literature to identify BCA studies (producing BCRs) conducted on programs in Australia and overseas that have, at least in part, aimed to reduce demand for illicit drugs.

Several complementary approaches exist to produce economic evidence, including cost analysis, cost-effectiveness analysis and BCA. Studies use different approaches to help respond to different questions. A BCA can help determine whether investment in programs to reduce demand for illicit drugs is a justifiable use of scarce resources (National Academies of Sciences, Engineering, and Medicine 2016). This review focused on studies that used BCA because this form of analysis values both outcomes and costs of an intervention in monetary terms, enabling it to be used to answer the question: for every dollar spent on programs to reduce demand for illicit drugs, how much, if anything, does the community save?

Method

Search strategy

Together with senior staff at the Australian Institute of Criminology's JV Barry Library, the literature search was conducted in June 2021 and involved two primary methods. First, we searched the websites of key drug and alcohol organisations in Australia (the National Drug and Alcohol Research Centre, the National Drug Research Institute, and the Alcohol and Drug Foundation) and overseas (the Drug Abuse Treatment Cost Analysis Program), and online research databases (PubMed, Cochrane Reviews, Ebsco Discovery, ProQuest, and the journals *Addiction* and PloS One) for research reports and peer-reviewed journal articles that met our eligibility criteria. The search combined terms relating to substance use and economic analyses (*demand reduction / substance misuse / substance abuse / illicit drugs / prescription drugs / drug education / drug use prevention / drug education OR prevention OR treatment / opioid-related disorders / substance-related disorders / drug use AND benefit cost / cost-effectiveness / economic analyses / costs and benefits / return on investment / cost benefit / health education / economics, medical / benefit cost / cost / economic / education OR treatment)*.

Studies were included if they:

- estimated the return on investment of demand reduction strategies targeted towards illicit drugs and (illegally used) prescription drugs;
- measured return on investment through a monetary BCR (indicating the dollars saved for every dollar spent on the intervention);
- measured costs and benefits among a comparison group;
- were published between 1 January 2000 and 30 June 2021 (to increase the likelihood the studies' results remained relevant); and
- were published in the English language.

Second, we searched the Washington State Institute for Public Policy (WSIPP) website for meta-analyses that met our eligibility criteria. WSIPP has conducted several hundred meta-analyses examining the costs and benefits of different public policies and programs implemented in the US state of Washington, using several eligibility criteria to select research studies for analysis. The most critical criteria are that the study must provide the necessary information to calculate an effect size and control for unobserved variables or reverse causality through either the use of a control or comparison group or advanced statistical methods (WSIPP 2019).

Studies were excluded if they focused only on the use of legal drugs (eg alcohol, tobacco, or prescription drugs used legally) or they referred to 'substance use' without specifying whether the programs targeted illicit drug use. Studies that measured outcomes related to alcohol use and illicit drug use were included, as were those that measured outcomes related to opioid use disorder.

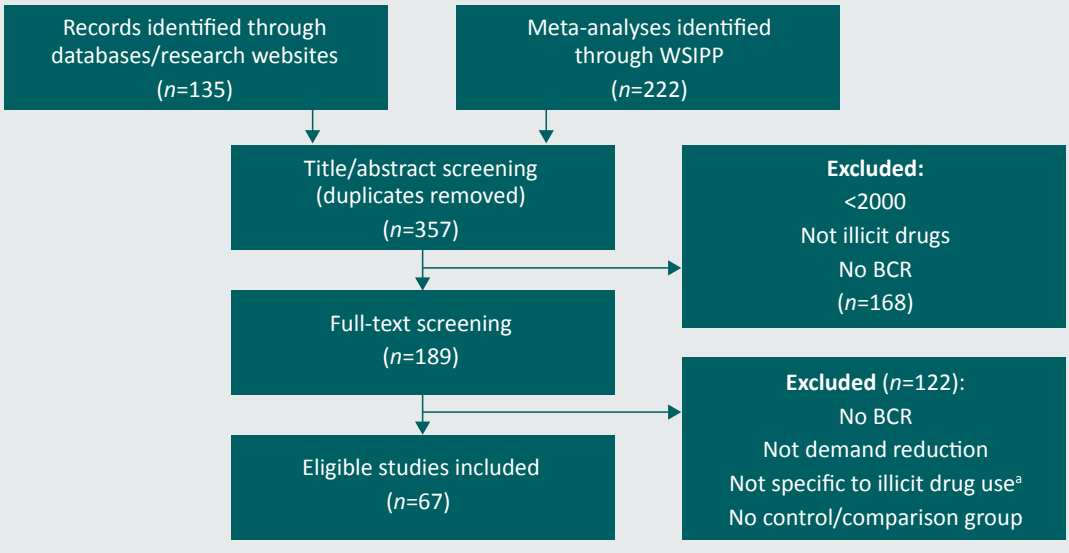
The review incorporated both peer-reviewed published journal articles and non-peer reviewed studies (eg government reports). This strategy was adopted because non-peer-reviewed studies represent a significant portion of the available evidence in many policy areas (WSIPP 2019). They were also included to minimise the risk that peer-reviewed publications were biased to show positive program effects.

Study selection and analysis

The search identified a total of 357 studies and meta-analyses (see Figure 1). The initial searches of research databases and drug and alcohol organisation websites identified 135 studies and the search of the WSIPP website identified 222 meta-analyses. We screened the titles and abstracts/summaries of reports for relevance based on the inclusion criteria. This process resulted in 168 studies being excluded because they did not meet the eligibility criteria. We then obtained full-text sources or accessed the WSIPP reports for the remaining 189 studies and assessed their eligibility. After full-text versions were reviewed, an additional 122 studies were excluded for various reasons (eg no BCR, not demand reduction). Empirical studies cited in a WSIPP meta-analysis were also excluded to avoid double-counting. The remaining 67 studies were included.

The BCRs reported in the included studies are described using summary statistics such as range, interquartile range (IQR) and median. The median and IQR are considered appropriate measures of central tendency, as the BCR data are numeric with a large positive skew (Manikandan 2011).

Figure 1: Search results for studies on cost effectiveness of demand reduction programs



a: Papers that focused on legal substances or did not differentiate between illicit and licit 'substance use'

Note: BCR=benefit–cost ratio. WSIPP=Washington State Institute for Public Policy (see WSIPP 2019)

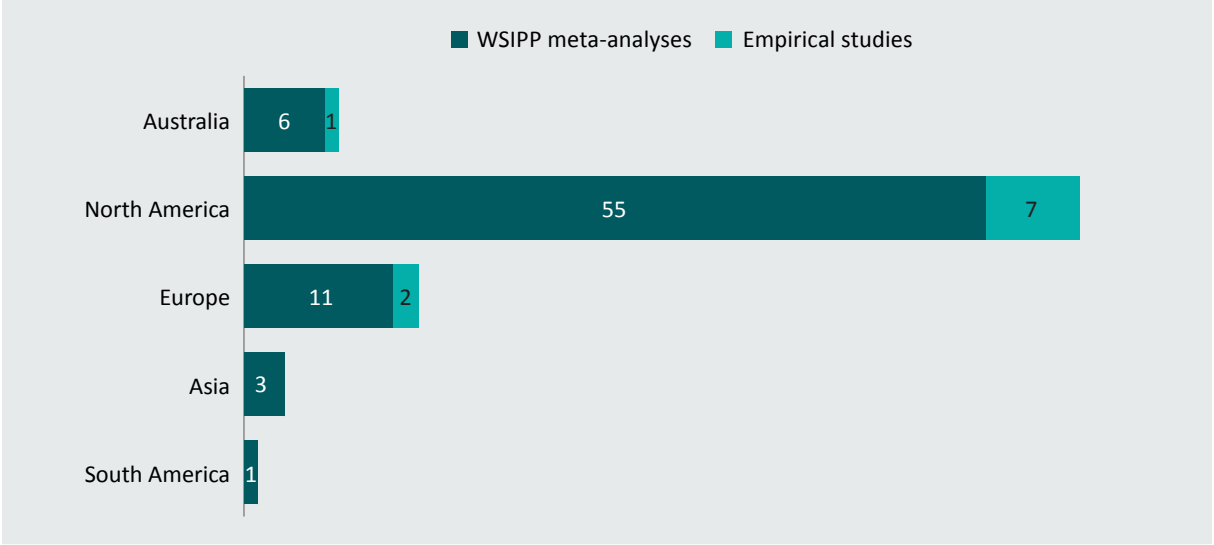
Results

Study characteristics

The 67 demand reduction studies include 10 empirical BCAs published as scientific journal articles or government reports (see Table 1), and 57 WSIPP meta-analyses (see Table 2). The studies performed a BCA of 70 programs, resulting in 70 separate BCRs.

The studies analysed programs in several continents (see Figure 2), mostly North America (*n*=62), Europe (*n*=13) and Australia (*n*=7). Almost all studies (97%, *n*=65) reported findings using United States dollars, whereas one study (Acumen Alliance 2005) used Australian dollars and another study (Deogan et al. 2015) used the euro.

Figure 2: Geographic location of demand reduction programs in included studies (*n*)



Note: Total includes 15 meta-analyses that incorporated data from multiple continents. WSIPP=Washington State Institute for Public Policy

More than half of the programs focused on the treatment of dependent, heavy or regular substance users (57%, *n*=40). Another 30 percent (*n*=21) were prevention programs implemented in schools or colleges (*n*=12), communities (*n*=7), family or residential settings (*n*=1) or a combination of settings (*n*=1). These prevention programs generally targeted broad populations, including people who did and did not use drugs. The remaining studies analysed diversionary law enforcement programs (13%, *n*=9), specifically drug court programs for drug-dependent offenders or sentencing alternatives.

Table 1: Demand reduction programs in journal articles and government report evaluations (*n*=13)

Study	Program	BCR	Net benefit (US$)
Prevention programs			
Guyll, Spoth & Crowley 2011	School-based Life Skills Training (LST) program	19.04	$2,273
Klapp et al. 2017	School-based social and emotional training intervention	13.90	$6,970
Kuklinski et al. 2021	Community-based Communities That Care program	12.88	$7,152
Guyll, Spoth & Crowley 2011	Community-based Iowa Strengthening Families (ISF) program	3.84	$2,813
Guyll, Spoth & Crowley 2011	Combined LST and ISF programs	1.56	$620
Deogan et al. 2015	School-based program Project ALERT	1.10	n/a
Law enforcement programs			
Loman 2004	St. Louis Adult Felony Drug Court	6.32	$1,362
Acumen Alliance 2005	Victorian Drug Court	5.81	n/a[a]
Anton 2007	Minnesota Drug Court	5.08	n/a[b]
Carey et al. 2006	California Drug Court	3.50	n/a[c]
Zarkin et al. 2005	Drug Treatment Alternative to Prison	2.17	$47,836
Treatment programs			
Dennis et al. 2011	Monitoring and recovery management check-ups (outpatients)	20.30[d]	n/a[e]
Dennis et al. 2011	Monitoring and recovery management check-ups (residential patients)	10.90[d]	n/a[e]

a: Reported a total annual net benefit of A$13.8m across all participants

b: Reported total benefits of US$6.8m and total costs of US$1.3m across all participants (during four-year period)

c: Reported a total annual net benefit of US$9.0m across all participants for each year a cohort of participants entered the courts

d: Assumes a reduction of one aggravated assault per average outpatient client

e: If participation reduced two thefts for the average outpatient client the net benefit would be US$1,785. If participation reduced one aggravated assault on average the benefit–cost ratio would be 10.9 for residential clients (107,020/9,833 = 10.9) and 20.3 for outpatient clients (107,020/5,279 = 20.3)

Note: BCR=benefit–cost ratio. Net benefit is calculated by subtracting total program costs from total program savings

Table 2: Demand reduction programs reviewed by WSIPP meta-analyses (*n*=57)

Program	BCR	Net benefit (US$)
Prevention programs		
School-based Lions Quest Skills for Adolescence	63.32	$695
Community-based Project STAR	38.50	$2,484
School-based All Stars	21.56	$2,255
School-based Keepin' it Real	11.52	$544
School-based Caring School Community	10.47	$10,417
School-based Too Good For Drugs	8.74	$436
School-based Project Towards No Drug Abuse	5.71	$327
School-based Marijuana Education Initiative Impact Awareness curriculum	5.71	$53
Community-based mentoring (taxpayer costs only)	3.91	$7,297

Table 2: Demand reduction programs reviewed by WSIPP meta-analyses (*n*=57) (cont.)		
Program	**BCR**	**Net benefit (US$)**
Family-based Familias Unidas	3.50	$3,930
Community-based mentoring, including volunteer costs	2.19	$4,884
Community-based PROmoting School-community-university Partnerships to Enhance Resilience	0.76	−$87
Community-based CASASTART	−0.35	−$17,844
School-based Drug Abuse Resistance Education	−12.53	−$779
School-based Project ALERT	−18.20	−$306
Law enforcement programs		
Juvenile Drug Court	53.66	$2,761
Drug Offender Sentencing Alternative (drug offences)	13.95	$22,198
Drug Offender Sentencing Alternative (property offences)	7.61	$11,334
Adult Drug Court	2.82	$9,438
Treatment programs		
Brief cognitive behavioural intervention for amphetamine users	52.64	$11,425
Therapy treating comorbid trauma and substance use: Seeking Safety	44.85	$18,265
Contingency management for substance use (high value)	39.30	$23,016
Contingency management for marijuana use (high value)	23.37	$13,445
Cognitive behavioural coping skills therapy for substance use disorder	23.09	$6,172
Motivational interviewing to enhance treatment engagement (brief)	23.05	$6,175
Brief marijuana dependence counselling	22.60	$12,665
Case management for drug-involved persons	16.36	$6,228
Outpatient or non-intensive drug treatment during incarceration	14.05	$10,291
Outpatient or non-intensive drug treatment in the community	13.42	$10,055
Contingency management for substance use (low value)	11.54	$2,773
Contingency management for opioid use (low value)	11.40	$3,895
Inpatient or intensive outpatient drug treatment during incarceration	10.13	$12,403
Other substance use disorder treatment for youth in state institutions	8.53	$25,716
Brief motivational intervention for students with substance use: Teen Intervene	7.86	$2,774
Community Reinforcement Approach with vouchers	7.54	$8,284
Sober living recovery houses	6.40	$1,633
Therapeutic communities for incarcerated individuals with substance use disorder	5.09	$9,481
Supportive-expressive psychotherapy for substance use	4.09	$6,624
Therapeutic communities for individuals with co-occurring disorders (in community)	3.25	$12,053
Matrix Model intensive outpatient treatment program for stimulant use disorders	2.87	$2,512
Therapeutic communities for individuals with substance use disorder (in community)	2.71	$6,825
Methadone maintenance for opioid use disorder	2.30	$5,162
Individual drug counselling for cocaine addiction	2.22	$3,059

Table 2: Demand reduction programs reviewed by WSIPP meta-analyses (*n*=57) (cont.)

Program	BCR	Net benefit (US$)
Buprenorphine (or buprenorphine/naloxone) maintenance therapy for opioid use disorder	1.78	$3,786
Contingency management for marijuana use (low value)	1.59	$156
Multisystemic Therapy–Substance Abuse for court-involved youth	1.58	$4,942
Brief motivational (peer-support) intervention for substance use disorder	1.20	$592
Brief treatment for youth substance use in medical settings	0.92	−$29
Day treatment with abstinence contingencies	0.42	−$3,323
Multidimensional Family Therapy	0.29	−$5,997
Motivational therapy Teen Marijuana Check-Up	0.12	−$101
Injectable naltrexone for opiates	−0.06	−$18,446
Injectable naltrexone for opioid use among adults post-prison	−0.17	−$20,376
Home-based recovery management/monitoring program Adolescent Assertive Continuing Care	−0.45	−$3,039
Methadone for opioid use disorder for adults post-release	−0.47	−$28,766
Cognitive behavioural coping skills therapy for opioid use disorder	−0.86	−$1,054
Inpatient or intensive outpatient drug treatment in the community	−1.75	−$2,574

Note: BCR=benefit–cost ratio. WSIPP=Washington State Institute for Public Policy. Net benefit is calculated by subtracting total program costs from total program savings. The WSIPP uses a benefit–cost model to produce a BCR that includes the estimated number of outcome 'units' produced by a program or policy, the price per unit of the outcome, the cost of producing the outcome and the number of years over which these values are evaluated. Future values are expressed in present value terms after applying a discount rate (2%, 3.5% or 5%). As the effects of a program may last many years, WSIPP's estimates reflect the total effect of the program over the life course. Noting that programs are often measured a few years after they end, WSIPP (nd) uses available evidence from studies to project how an outcome remains or decreases over time. WSIPP (nd) looks at measurements of the outcome at different time points and at studies designed to measure the persistence of changes in the outcome and uses that information to estimate the effect in the future. A negative BCR was produced when the total benefits of a program were negative

Benefit–cost analysis results

Studies estimated a range of costs involved in the implementation and expansion of programs. This included costs of the facilities, equipment and supplies, staffing, personnel, contractors, training and technical assistance, consultations and program monitoring, travel, urinalysis testing, administration, screening, and assessment and intake. Most studies examined benefits across three domains:

- savings to the CJS through reduced recidivism;
- savings to the economy through higher earnings among participants; and
- savings to the healthcare system from reduced morbidity and mortality.

Tables A1 and A2 include more information about the benefits of each study.

Net benefits (total benefits minus total costs) ranged from −US$28,766, for a program that provided methadone to adults with opioid use disorder released from prison, to US$47,836 for a program delivering a drug treatment alternative to prison. WSIPP meta-analyses reported on the length of time required for benefits to outweigh costs after initial investment among 43 programs with a net benefit. Most generated net benefits within one to five years (67%, *n*=29), with a minority requiring six to 10 years (14%, *n*=6) or more than 10 years (19%, *n*=8) to generate net benefits.

Benefit–cost ratios

Across the 70 BCRs, 56 (80%) exceeded 1.0, indicating the program savings outweighed overall costs (see Figure 3). The 14 (20%) remaining BCRs were less than 1.0, indicating that program costs outweighed savings. Overall, BCRs ranged from −18.20 for Project ALERT, a United States substance use prevention program for middle school students, up to 63.32 for Lions Quest Skills for Adolescence, another education program for middle school students in the United States. Most values were between 1.58 and 13.42 (IQR), with a median ratio of 5.40.

Types of programs

Favourable economic returns were evident for prevention, treatment and law enforcement programs. The BCR varied by program type, with the largest median ratio reported for law enforcement programs (median=5.81; range=2.17–53.66; IQR=3.50–7.61; *n*=9). Every law enforcement program generated a BCR over 1.0.

Smaller median ratios were reported for treatment programs (median=4.59; range= −1.75–52.64; IQR=1.06–13.74; *n*=40) and prevention programs (median=5.71; range= −18.20–63.32; IQR=1.56–12.88; *n*=21). While most treatment and prevention programs produced a positive return on investment, 14 had a BCR under 1.0.

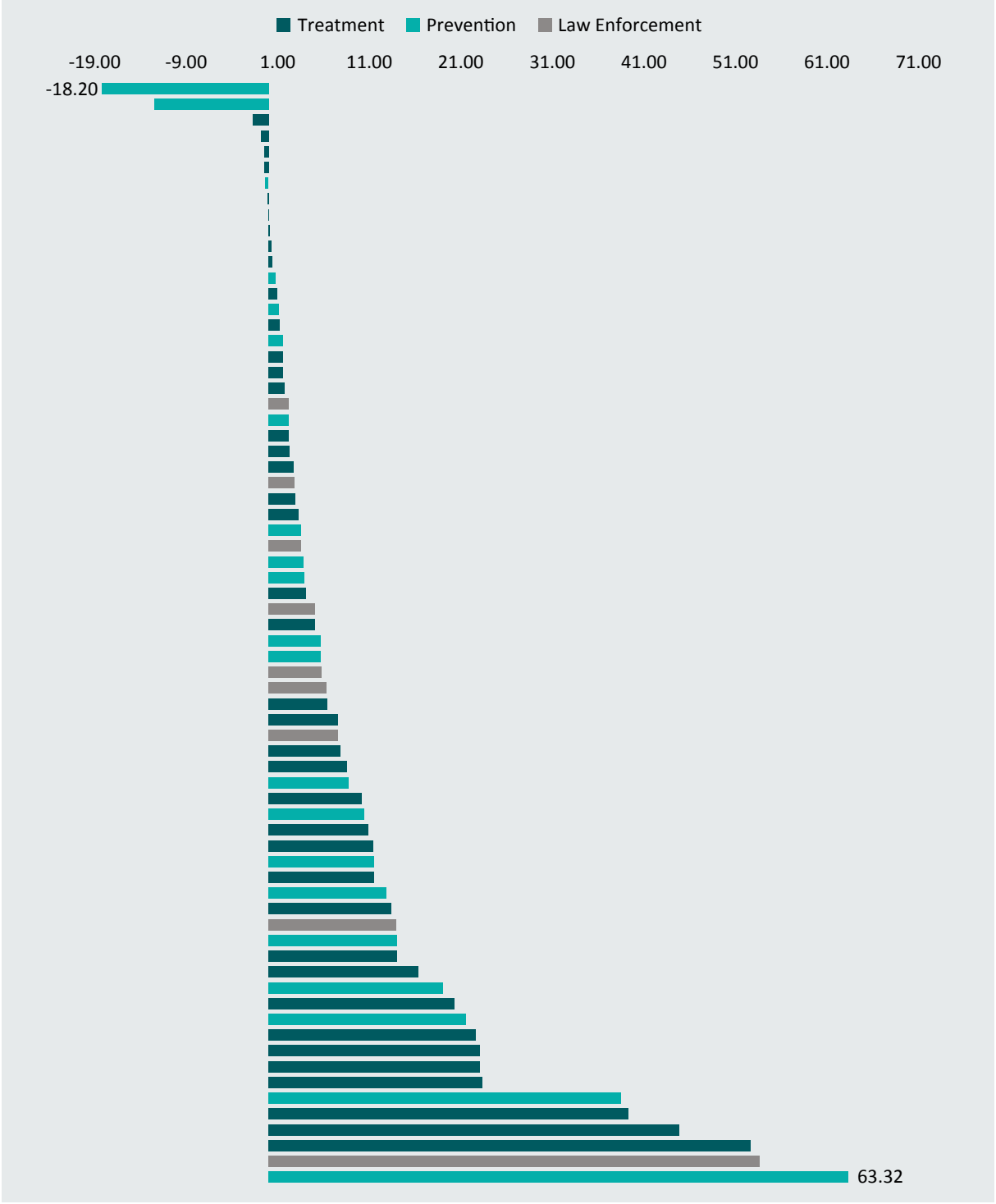
Adult versus youth programs

Programs aimed at adults (*n*=39) involved treatment (79%, *n*=31) or law enforcement interventions (21%; *n*=8) for individuals with drug dependency issues. No prevention programs targeted adults. Among interventions aimed at young people (*n*=29), almost three-quarters were prevention programs (72%, *n*=21) implemented in schools, communities or homes. Another seven (24%) were treatment programs.

BCRs for programs targeting young people (median=3.91; range= −18.20–63.32; IQR=0.92–11.52) were lower than those for programs aimed at adults (median=6.32; range= −1.75–52.64; IQR=2.30–14.05), but they varied by program type. For example, the median BCR for prevention programs aimed at young people was higher (median=5.71; range= −18.20–63.32; IQR=1.56–12.88; *n*=21) than the median BCR for treatment programs for young people (median=0.92; range= −0.45–8.53; IQR=0.12–7.86; *n*=7).

One of the highest BCRs for youth programs was that for youth drug courts, which had a substantially higher BCR than adult drug courts. Drug courts for young people were relatively inexpensive (US$52 per participant) but generated US$2,813 in savings per participant, producing a net benefit of US$2,761 per participant and a BCR of 53.66. Program costs for adult drug courts were higher (US$5,182 per participant) than those for young people and total benefits were US$14,620 per adult. This meant that the net benefit was US$9,438 and its BCR was 2.82.

Figure 3: Benefit–cost ratios among included studies, by program type (*n*=70)



Note: A benefit–cost ratio over 1.0 indicates a net benefit (program savings outweigh costs)

Type of drug use

Programs that targeted a broad range of substances typically reported larger BCRs than programs aimed at specific types of illicit drugs. Programs focused on all forms of illicit and legal drug use or all forms of illicit drug use (*n*=52), rather than specific substances, had BCRs ranging from −18.20 to 63.32, with a median BCR of 6.36 (IQR=2.18–13.66). Another 18 programs focused on demand reduction for specific types of drug: opioids (*n*=7), stimulants (*n*=6) and cannabis (*n*=5). BCRs for these drug-specific programs ranged from −0.86 to 52.64, with a median of 2.26 (IQR=0.12–11.40).

Peer-reviewed vs non-peer-reviewed studies

The BCRs found in peer-reviewed empirical studies ranged from 1.10 to 20.30, while the ratio for non-peer-reviewed empirical studies ranged from 5.08 to 6.32. The median BCR in peer-reviewed studies was 7.37 (*n*=10), slightly higher than the median BCR in the non-peer-reviewed studies (5.81), although the number of non-peer-reviewed studies was small (*n*=3). We did not compare the peer-reviewed and non-peer-reviewed studies in the WSIPP meta-analyses because each meta-analysis included all available studies that met the WSIPP's criteria, resulting in a combination of peer-reviewed and non-peer-reviewed studies.

Discussion

This review synthesised 67 benefit–cost analyses from around the world—mostly North America—to estimate the return on investment of programs aimed at reducing demand for illicit drugs. Of the 70 separate BCRs, 80 percent indicated positive economic returns. The median BCR was 5.40, meaning that every dollar spent on programs to reduce demand for illicit drugs results in an estimated $5.40 in return. These findings indicate demand reduction programs are generally an economical way to reduce illicit drug use.

Fourteen programs did not produce positive economic returns, most of which were treatment programs targeting problematic drug use among young people or adults. Demand reduction programs with a low BCR were not necessarily ineffective at preventing illicit drug use; rather, the estimated savings of the program did not exceed the costs of the program. Moreover, 'savings' in these studies referred not only to monetary gains. Programs producing a positive economic return save a range of resources, including time and personnel, which can be redirected elsewhere to benefit society (Downey & Roman 2014).

The review found substantial variation in the estimated net benefits and BCRs. The programs estimated to produce positive economic returns had net benefits ranging from US$53 for a school-based cannabis education program to US$47,836 for a program delivering a drug treatment alternative to prison. The largest BCR was 63.32 for a life skills education program for middle school students.

Each of the three types of demand reduction programs produced generally positive economic returns. Law enforcement programs had the highest median BCR, with particularly positive results for juvenile drug courts. Prevention initiatives for young people were also associated with higher BCRs than youth treatment programs, suggesting these programs may be an economical way to reduce demand for illicit drugs among young people. Prevention programs may be economical because they have low implementation costs, can be easily scaled up for larger numbers of students, and maximise the length of time over which positive outcomes can be experienced (Caulkins et al. 1999; Fagan et al. 2019).

Programs that targeted multiple substances had a higher median BCR than programs that targeted specific types of drugs. The relative benefits of programs targeting multiple substances may be related to polydrug use, which refers to the consumption of more than one substance concurrently or sequentially (Kedia, Sell & Relyea 2007). Polydrug use is common among people who use illicit drugs and is associated with an increased risk of physical illness, mental health problems and drug dependence (European Monitoring Centre for Drugs and Drug Addiction 2009). Programs that prevent polydrug use may be associated with greater overall societal benefits than programs focused on specific drugs, serving as a more economical way to reduce demand for illicit drugs.

Efforts to reduce demand for illicit drugs may include other types of programs not reviewed in this study. Evidence suggests street-level drug law enforcement (eg police crackdowns on drug markets) may increase the willingness of dependent drug users to seek treatment in the longer term (Weatherburn et al. 2000). Our literature search did not identify any eligible studies that estimated the BCR of street-level drug law enforcement strategies. The lack of eligible studies may reflect that, in general, few attempts have been made to calculate the monetary costs and benefits of crime prevention programs (Welsh & Farrington 2000). It may also partly reflect the search terms this review used.

The data for each BCA reviewed in this study were specific to the population studied, including the participants' level of socioeconomic disadvantage, geographic location and patterns of substance use (Downey & Roman 2014). The findings for specific studies also depended on which costs and benefits were measured, and how these factors were measured and valued. The differences between estimated BCRs in the studies may in part reflect differences in their approaches to the measurement of non-monetary or intangible costs. Pacula et al. (2009) note that, while these costs are recognised as a significant aspect of the total burden of drug abuse, it is difficult to place a monetary value on such personal measures, and there is substantial debate in the literature on how best to do so. The cost savings or benefits differed across the studies we reviewed. The WSIPP's model measures benefits including earnings, medical costs, treatment costs, the value of a statistical life, property loss, higher education costs, school grade repetition and CJS cost savings. For programs with CJS cost savings, the WSIPP model computes the value to taxpayers and would-be victims of crimes avoided, including tangible and intangible victim costs (WSIPP 2019).

Estimating economic returns involves considerable uncertainty (Cannon et al. 2017) and the costs and benefits in this report were all estimates with some degree of uncertainty. Another limitation was the lack of benefit–cost evidence for Australian demand reduction programs. Although five meta-analyses incorporated data from Australian studies, the overall findings were aggregated with data from other regions. Nonetheless, evidence from two programs was specific to Australia. These studies demonstrated promising results, with savings outweighing costs in both programs.

A further limitation is that this review did not adjust the results based on factors such as the study's methodological quality, its setting (Australia vs overseas), publication source (eg peer-reviewed vs non-peer-reviewed) or other factors. The review treated BCRs as comparable even though the programs had different outcomes and were administered in different countries and settings, and evaluations were reported in diverse sources. The literature has identified a need for standardisation in BCA methods for social programs (Vining & Weimer 2010), and the development of such principles and standards can support the comparability of different BCAs (Karoly 2010). This review drew largely on meta-analyses by the WSIPP, which, although projecting the effect in Washington, apply a common set of methods to estimate BCRs and net benefits for a range of programs. The WSIPP's use of an internally consistent modelling approach enables comparisons with other programs in each topic area (WSIPP 2019).

This analysis is also limited by its comparison of all programs' BCRs irrespective of the measures used to create them or the scale of the program evaluated. Research in areas such as early childhood development and education has identified examples where adapting programs on a larger scale can result in smaller improvements in outcomes compared with 'demonstration' or research projects (Cannon et al. 2017; Lipsey 2018). While this review did not modify the magnitude of program impacts or their BCRs, the WSIPP adjusts the results of its meta-analyses to account for methodological quality, researcher involvement, measured outcomes, research setting and evaluations with wait-list research designs (WSIPP 2019). Importantly, it uses these adjusted effect sizes in its benefit–cost model (WSIPP 2019). These assumptions tend to be conservative and will magnify differences across studies analysed using the WSIPP model and other studies, which generally do not adjust results based on such characteristics (Cannon et al. 2017).

Other approaches can be used to evaluate the costs and benefits of interventions to reduce demand for illicit drugs. Cost-effectiveness analysis quantifies the ratio of the intervention cost to intervention outcomes, estimating the cost required to produce each unit of prevention (Guyll, Spoth & Cornish 2012). A cost-effectiveness evaluation of the New South Wales Drug Court found it cost A$19,000 more to prevent an opiate use/possession offence using conventional sanctions than with the Drug Court (Lind et al. 2002). Cost-effectiveness analysis can compare alternative courses of action (eg different programs) when the same outcome is assessed for both alternatives, but these alternatives cannot be compared if their effectiveness is measured according to different outcomes (Guyll, Spoth & Cornish 2012). A BCA builds on this by valuing, ideally, all outcomes of an intervention in monetary terms so the aggregate value of the outcomes can be compared with the full economic cost of attaining those outcomes (National Academies of Sciences, Engineering, and Medicine 2016). An advantage of BCA is that it can incorporate the dollar value of multiple impacts even when measured differently (French et al. 2008; Kuklinski et al. 2021). It aggregates the costs and benefits into a single quantity and includes the external effects on society (Sindelar et al. 2004).

In principle and ideal form, a BCA facilitates comparisons across interventions to identify which provide the highest ratio of benefits to costs when available resources are restricted (National Academies of Sciences, Engineering, and Medicine 2016).

When carefully implemented within the appropriate population, demand reduction programs for illicit drug use in Australia and overseas reduce the numerous societal harms associated with drug use, and can provide a net economic benefit to society. Further benefit–cost research is needed to estimate the return on investment of demand reduction programs in Australia, particularly for empirically-validated substance use prevention programs among young people, which appear promising given the reviewed evidence.

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URLs correct as at July 2022

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Appendix

Table A1: Outcomes measured and time horizon in demand reduction programs in journal articles and government report evaluations

Prevention programs	Outcomes measured and time horizon
School-based Life Skills Training (LST) program Community-based Iowa Strengthening Families (ISF) program Combined LST and ISF programs	Employee absenteeism, healthcare costs, theft, turnover, productivity. Costs for the LST intervention included boosters implemented one year after implementation and were discounted at 3 percent. Benefits based on employer costs associated with each case of methamphetamine use for each year of age throughout the employment career (ie ages 18–65), discounted at 3 percent per year from age at which they were estimated to occur back to age 12.
School-based social and emotional training intervention	Lost productivity due to sick leave and premature death, CJS, health and social care treatment, insurance, private health care. Estimated total costs for the intervention over five years, with costs calculated in 2013 Swedish prices and a discount rate of 3.5 percent. Follow-up data for participants' drug use as adults were not available, so projections were made.
Community-based Communities That Care program	Crime, earnings, healthcare. Costs and benefits discounted to intervention start at 3.5 percent per year.
School-based program Project ALERT	Legal events, psychosis, schizophrenia, traffic accidents, depression, amotivational syndrome. Follow-up periods from one year to a lifetime, considering a discount rate of 3 percent, with costs inflated to 2013 levels.
Law enforcement programs	**Outcomes measured and time horizon**
St. Louis Adult Felony Drug Court	Drug-exposed infants, crime, prison, arrests, subsequent treatment, subsequent psychiatric services, Medicaid, welfare, taxes, wages, subsequent prison, subsequent supervision. Costs and benefits estimated for four years after drug court or probation. Costs calculated in 2002 US dollars, with no discounting reported.
Victorian Drug Court	Court cases, prison days, demand for victims of crime services, drug treatment places, emergency accommodation placements, public housing placements, demand for health services, reduced likelihood of contracting bloodborne diseases, crime, unemployment, community safety. Reported a total annual net benefit of A$13.8m across all participants. Costs and benefits were calculated on a single year basis, with no discounting reported.
Minnesota Drug Court	Processing offenders through regular courts, incarcerating offenders, law enforcement for subsequent arrests, victims of crimes involved in subsequent arrests, prosecution costs for subsequent convictions, incarceration costs for subsequent convictions. Reported total net benefit of US$5.5m across all participants. Benefits estimated for 2001–05. No discounting reported.
California Drug Court	Rearrests, new court cases, jail/prison/probation time services, victimisation costs, treatment episodes after program exit. Reported a total annual net benefit of US$9.0m across all participants. Benefits measured over four-year period. Costs calculated in 2005 US dollars, with no discounting reported.

Table A1: Outcomes measured and time horizon in demand reduction programs in journal articles and government report evaluations (cont.)	
Drug Treatment Alternative to Prison	CJS costs associated with recidivism (eg prison, court). Costs and benefits estimated for six-year period starting from an individual's initial arrest. Benefits and costs were compared annually and cumulatively over six years, with costs measured in 2001 US dollars and discounted at 3 percent to year one.
Treatment programs	**Outcomes measured and time horizon**
Monitoring and recovery management check-ups (outpatient and residential patients)	Crime (theft and aggravated assault), hospital days, substance abuse treatment. Costs and benefits estimated for 12 months. Costs calculated in 2007 US dollars, with no discounting reported.

Note: CJS=criminal justice system

Table A2: Outcomes measured for demand reduction programs reviewed by WSIPP meta-analyses	
Prevention programs	**Outcomes measured**
School-based Lions Quest Skills for Adolescence	CJS cost savings related to cannabis use, earnings, property loss, health care, mortality associated with problem alcohol use.
Community-based Project STAR	CJS cost savings related to cannabis use, property loss associated with alcohol abuse/dependence, earnings associated with cannabis abuse/dependence, health care associated with illicit drug abuse/dependence, mortality associated with smoking.
School-based All Stars	CJS cost savings related to cannabis use, health care and mortality associated with smoking, earnings and property loss associated with alcohol abuse/dependence.
School-based Keepin' it Real	CJS cost savings related to cannabis use, health care associated with smoking, earnings and property loss associated with alcohol abuse/dependence, mortality associated with alcohol.
School-based Caring School Community	CJS cost savings, earnings associated with test scores, health care associated with smoking or cannabis abuse/dependence, property loss associated with alcohol abuse/dependence, mortality associated with smoking or alcohol.
School-based Too Good For Drugs	CJS cost savings related to cannabis use, health care and mortality associated with smoking, earnings and property loss associated with alcohol abuse/dependence.
School-based Project Towards No Drug Abuse	CJS cost savings related to cannabis use, earnings associated with high school graduation, property loss associated with alcohol abuse/dependence, higher education costs, mortality associated with smoking.
School-based Marijuana Education Initiative Impact Awareness curriculum	CJS cost savings related to cannabis use, earnings and health care associated with cannabis abuse/dependence.
Community-based mentoring (taxpayer costs only)	CJS cost savings, earnings associated with high school graduation, property loss associated with alcohol abuse/dependence, health care associated with cannabis abuse/dependence, higher education costs, mortality associated with alcohol.

Table A2: Outcomes measured for demand reduction programs reviewed by WSIPP meta-analyses (cont.)	
Family-based Familias Unidas	CJS cost savings related to cannabis use, K–12 grade repetition, K–12 special education, earnings and property loss associated with alcohol abuse/dependence, health care associated with externalising behaviour, mortality associated with alcohol.
Community-based mentoring, including volunteer costs	CJS cost savings, earnings associated with high school graduation, property loss associated with alcohol abuse/dependence, health care associated with cannabis abuse/dependence, higher education costs, mortality associated with alcohol.
Community-based PROmoting School-community-university Partnerships to Enhance Resilience	CJS cost savings, earnings and property loss associated with alcohol abuse/dependence, health care associated with illicit drug abuse/dependence, mortality associated with smoking.
Community-based CASASTART	CJS cost savings, earnings associated with high school graduation, K–12 grade repetition, earnings and property loss associated with alcohol abuse/dependence, health care associated with illicit drug abuse/dependence, higher education costs, mortality associated with alcohol.
School-based Drug Abuse Resistance Education	CJS cost savings related to cannabis use, health care associated with smoking or illicit drug abuse/dependence, earnings and property loss associated with alcohol abuse/dependence, mortality associated with smoking.
School-based Project ALERT	CJS cost savings related to cannabis use, earnings, property loss, health care, mortality associated with problem alcohol use.
Law enforcement programs	**Outcomes measured**
Juvenile Drug Court	CJS cost savings, earnings associated with high school graduation, higher education costs
Drug Offender Sentencing Alternative (drug offences)	CJS cost savings
Drug Offender Sentencing Alternative (property offences)	CJS cost savings
Adult Drug Court	CJS cost savings
Treatment programs	**Outcomes measured**
Brief cognitive behavioural intervention for amphetamine users	CJS cost savings related to illicit drug use disorder, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Therapy treating comorbid trauma and substance use Seeking Safety	CJS cost savings related to alcohol use disorder, earnings and health care associated with alcohol abuse/dependence or post-traumatic stress disorder, property loss associated with alcohol abuse/dependence, mortality associated with illicit drugs or alcohol.
Contingency management for substance use (high value)	CJS cost savings related to illicit drug use disorder, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Contingency management for marijuana use (high value)	Earnings and health care associated with cannabis abuse/dependence.

Table A2: Outcomes measured for demand reduction programs reviewed by WSIPP meta-analyses (cont.)	
Cognitive behavioural coping skills therapy for substance use disorder	CJS cost savings related to alcohol use disorder, earnings and property loss associated with alcohol abuse/dependence, health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Motivational interviewing to enhance treatment engagement (brief)	CJS cost savings associated with alcohol use disorder, earnings and property loss associated with alcohol abuse/dependence, health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Brief marijuana dependence counselling	Earnings and health care associated with cannabis abuse/dependence.
Case management for drug-involved persons	CJS cost savings, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Outpatient or non-intensive drug treatment during incarceration	CJS cost savings
Outpatient or non-intensive drug treatment in the community	CJS cost savings
Contingency management for substance use (low value)	CJS cost savings related to illicit drug use disorder, property loss associated with alcohol abuse/dependence, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Contingency management for opioid use (low value)	CJS cost savings related to opioid use disorder, earnings and health care associated with opioid drug abuse/dependence, mortality associated with opioids.
Inpatient or intensive outpatient drug treatment during incarceration	CJS cost savings
Other substance use disorder treatment for youth in state institutions	CJS cost savings associated with alcohol use disorder, earnings and property loss associated with alcohol abuse/dependence, health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Brief motivational intervention for students with substance use Teen Intervene	CJS cost savings related to cannabis use, earnings, property loss, health care, mortality associated with problem alcohol use.
Community Reinforcement Approach with vouchers	CJS cost savings related to illicit drug use disorder, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Sober living recovery houses	CJS cost savings, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Therapeutic communities for incarcerated individuals with substance use disorders	CJS cost savings, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Supportive-expressive psychotherapy for substance use	CJS cost savings, earnings, property loss associated with alcohol abuse/dependence, health care associated with illicit drug abuse/dependence or major depression, mortality associated with illicit drugs or alcohol.

Table A2: Outcomes measured for demand reduction programs reviewed by WSIPP meta-analyses (cont.)	
Therapeutic communities for individuals with co-occurring disorders (in community)	CJS cost savings, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Matrix Model intensive outpatient treatment program for stimulant use disorders	CJS cost savings related to illicit drug use disorder, earnings associated with alcohol abuse/dependence or illicit drug abuse/dependence, health care associated with alcohol abuse/dependence or illicit drug abuse/dependence, property loss associated with alcohol abuse/dependence, mortality associated with illicit drugs or alcohol.
Therapeutic communities for individuals with substance use disorder (in community)	CJS cost savings, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Methadone maintenance for opioid use disorder	CJS cost savings, earnings and health care associated with opioid drug abuse/dependence, mortality associated with opioids.
Individual drug counselling for cocaine addiction	CJS cost savings related to illicit drug use disorder, earnings and health care associated with illicit drug abuse/dependence or anxiety disorder, mortality associated with illicit drugs.
Buprenorphine (or buprenorphine/naloxone) maintenance therapy for opioid use disorder	CJS cost savings related to opioid use disorder, earnings and health care associated with opioid drug abuse/dependence, mortality associated with opioids.
Contingency management for marijuana use (low value)	Earnings and health care associated with cannabis abuse/dependence.
Multisystemic Therapy–Substance Abuse for court-involved youth	CJS cost savings, earnings and health care associated with cannabis abuse/dependence.
Brief motivational (peer-support) intervention for substance use disorder	CJS cost savings related to illicit drug use disorder, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Brief treatment for youth substance use in medical settings	CJS cost savings related to cannabis use, earnings, property loss, health care, mortality associated with problem alcohol use.
Day treatment with abstinence contingencies	CJS cost savings related to illicit drug use disorder, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.
Multidimensional Family Therapy	CJS cost savings, K–12 special education, earnings associated with cannabis abuse/dependence, health care associated with externalising behaviour.
Motivational therapy Teen Marijuana Check-Up	Earnings and health care associated with cannabis abuse/dependence.
Injectable naltrexone for opiates	CJS cost savings related to opioid use disorder, property loss associated with problem alcohol use, earnings and health care associated with opioid drug abuse/dependence, mortality associated with opioids.
Injectable naltrexone for opioid use among adults post-prison	CJS cost savings, property loss associated with alcohol abuse/dependence, earnings and health care associated with opioid drug abuse/dependence, mortality associated with opioids.

Table A2: Outcomes measured for demand reduction programs reviewed by WSIPP meta-analyses (cont.)	
Home-based recovery management/monitoring program Adolescent Assertive Continuing Care	CJS cost savings related to alcohol use disorder, earnings and property loss associated with alcohol abuse/dependence, health care associated with cannabis abuse/dependence, mortality associated with alcohol.
Methadone for opioid use disorder for adults post-release	CJS cost savings, earnings and property loss associated with alcohol abuse/dependence, health care associated with illicit drug abuse/dependence or emergency department visits, mortality associated with illicit drugs.
Cognitive behavioural coping skills therapy for opioid use disorder	CJS cost savings related to opioid use disorder, earnings and health care associated with opioid drug abuse/dependence, mortality associated with opioids.
Inpatient or intensive outpatient drug treatment in the community	CJS cost savings, earnings and health care associated with illicit drug abuse/dependence, mortality associated with illicit drugs.

Note: CJS=criminal justice system

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