European Monitoring Centre
for Drugs and Drug Addiction

ISSN2 2315-1463

EMCDDA PAPERS

Communities That Care (CTC): a comprehensive prevention approach for communities

Abstract: Community coalitions are a strategy to coordinate activities and resources to prevent adolescent substance use and delinquent behaviour. They can bring together diverse community stakeholders to address a common goal and have the benefit of mobilising communities in prevention and health promotion initiatives.

The Communities That Care (CTC) approach is based on the premise that the prevalence of adolescent health and behaviour problems in a community can be reduced by identifying strong risk factors and weak protective factors experienced by the community's young people and by then selecting tested and effective prevention and early intervention programmes that address these specific risk and protective factors.

For this review, we found a total of five studies evaluating the effectiveness of CTC and one narrative review of international organisations, mainly from outside the EU. Overall, our analysis suggests some evidence of effectiveness of the CTC approach as a drug prevention initiative in the non-EU studies. As cultural factors probably play an important role in the implementation of this sort of community mobilisation approach, this review suggests that effectiveness still needs to be assessed in a European context. It would then be possible to evaluate the CTC approach in Europe through a multisite randomised controlled trial. Given the findings from existing studies and the well-developed theoretical model behind CTC, further investigation of this prevention model within the European context appears to be merited.

Keywords **Communities That Care** **prevention** **multifaceted interventions** **systematic reviews**

Recommended citation: European Monitoring Centre for Drugs and Drug Addiction (2017), *Communities That Care (CTC): a comprehensive prevention approach for communities*, EMCDDA Papers, Publications Office of the European Union, Luxembourg.

Background

Drug dependence is a complex problem, the understanding of which requires an extensive knowledge of the determinants of behavioural disturbances in a given context (West and Brown, 2013). The absence of a sufficiently clear picture of the dynamics and determinants of initial drug abuse, however, hinders the implementation of effective prevention programmes. Application of evidence-based thinking to primary prevention is hampered by the complexity of the causal chain. This chain includes the relationships between risk factors and the problem to be prevented and the relationship between the preventative intervention and the reduction of the risky behaviour (Faggiano et al., 2014).

Experimental use of drugs affects mainly adolescents, who may consume drugs simply for the euphoria that they can produce or to feel accepted by their peers (Leshner, 1999). As the neurological or psychological factors affecting the risk of addiction are not known, 'even occasional drug use can inadvertently lead to addiction' (Leshner, 1997, 1999). Furthermore, according to the gateway theory (van Leeuwen et al., 2011), the use of some substances can lead to more intensive consumption of others, including illicit substances. Among young people, early initiation into alcohol use has been shown to be linked to later binge drinking, heavy drinking and alcohol-related problems (Kandel and Kandel, 2015) in prospective longitudinal studies (Moss et al., 2014; Trenz et al., 2012; Winters and Lee, 2008).

A recent meta-analysis showed that regular cannabis use in adolescence approximately doubles the risks of early school-leaving and of cognitive impairment and psychoses in adulthood (Hall, 2015). In addition, regular cannabis use in adolescence is strongly associated with the use of other illicit drugs. Independently of the model explaining addiction (West, 2013), there is a consensus that interventions should primarily aim to reduce or delay first use or prevent the transition from experimental use to addiction.

Mobilising communities to act as their own agents of change is an important strategy to prevent health and behaviour problems in young people (Butterfoss, 2006; Chinman et al., 2005; Green et al., 2001). The results of studies in prevention science, including evidence regarding predictors of health and behaviour problems, suggest that a science-based community prevention services system can be effective in promoting the health and well-being of young people living in the community (Hawkins et al., 2002).

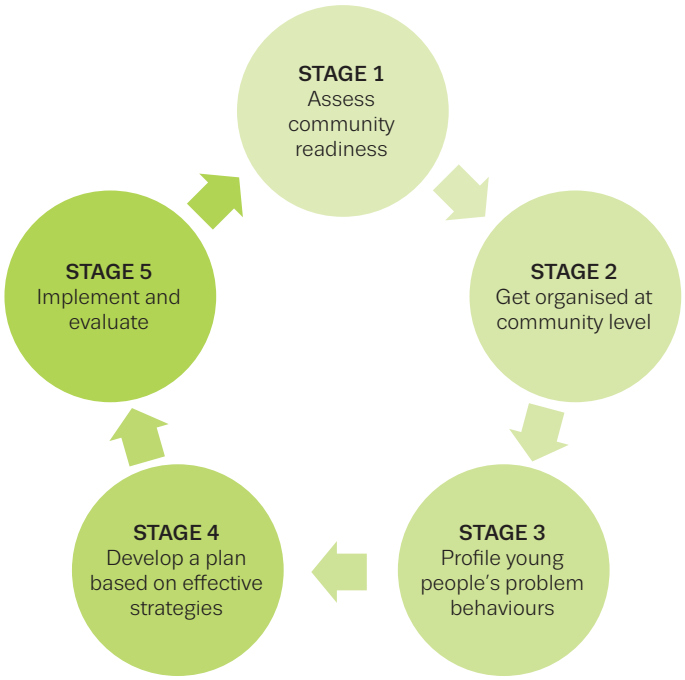
How the intervention works

Communities That Care (CTC) (Hawkins and Catalano, 2002; Hawkins et al., 2002) is a system for mobilising communities to address adolescent health and behaviour problems systematically through the adoption of a science-based approach to prevention. It is, effectively, a prevention operating system, in that it provides a method for helping communities to select and implement programmes. CTC organises the adoption of a science-based approach to prevention into five stages, each of which is guided by a set of 'milestones' and 'benchmarks' that are used to monitor CTC implementation (Hawkins and Catalano, 2002; Quinby et al., 2008).

This approach is based on the premise that a reduction in the prevalence of adolescent health and behaviour problems in a community can be achieved by identifying elevated risk factors and lowered protective factors that are experienced by the community's young people and then selecting tested and effective prevention and early intervention programmes that address these specific risk and protective factors.

Communities typically reach the fifth stage of CTC implementation in 9-12 months (Figure 1). Changes in priority risk/protective factors and problem behaviours are expected within 2-5 years following the introduction of CTC (Fagan et al., 2008; Quinby et al., 2008).

FIGURE 1
Stages of a CTC programme



Stage 1: the community's readiness to implement CTC is assessed and community coordinators and leaders are identified. Stage 2: community leaders decide, after opting for CTC, whether or not to organise and identify a community prevention coalition to carry out the functions of a CTC board. If it is feasible to implement CTC, community coordinators and coalition members are trained in CTC and the prevention coalition is organised to carry out subsequent stages of CTC. Stage 3: adolescent risk/protective factors and problem behaviours are assessed using a school-based survey in the community and local services that seek to address priority risk and protective factors are identified. Stage 4: the community prevention coalition reviews the results of the assessment and selects tested effective policies and programmes. Stage 5: the programmes are implemented and adolescent outcomes are monitored (Haggerty and Shapiro, 2013).

Activities within the early stages of CTC implementation are designed to build collaborative capacity (Foster-Fishman et al., 2001) within the community prevention coalition and collaborative relationships with other community organisations, agencies and individuals concerned with preventing adolescent health and behaviour problems. The process by which collaborative capacity can be built in to communities can be described by the Social Development Model (Catalano and Hawkins, 1996; Hawkins and Weiss, 1985). Through a sequence of training and technical assistance activities, CTC builds the community's capacity for collaborative action by specifying opportunities for community participation, developing skills for constructive engagement in strategic prevention planning and providing recognition of and reinforcement for collaboration.

CTC seeks to (1) generate greater community ownership of prevention initiatives; (2) reduce duplication and fragmentation of community resources; (3) reduce interagency competition; (4) improve the sustainability of prevention measures; and (5) provide 'a vehicle for solving problems that are too complex to be solved by a single agency' (Jasuja et al., 2005). Collaboration between multiple community sectors is an essential component of CTC's theory of change.

The Social Development Model also informs the interactions with young people that CTC seeks to promote in order to encourage healthy development. It involves the following: providing developmentally appropriate opportunities for young people; teaching them the skills they need; giving recognition for effort, improvement and achievement; promoting positive bonding, whether with a family or with other adults, such as teachers or neighbours; and upholding clear standards of behaviour. The Social Development Model has been tested empirically and found to be effective (Hawkins et al., 2008a).

Why this review?

The objective of this paper is to review the evidence on the effectiveness of CTC programmes in preventing substance misuse in young people. In the context of public sector austerity in many developed western countries, there is increasing pressure on communities to play a greater role in deciding which services should be provided locally and a growing recognition that the community voice is important and should be heard. CTC is therefore of interest because it is based on community mobilisation using a model that incorporates the following stakeholders: law enforcement representatives, schools, local government representatives, social services providers, health services providers, community 'activists' and parents and/or young people. The undertaking of this review has been facilitated by the fact that there are some good-quality studies with diverse results, with the caveat that, although data from elsewhere are available, most research in this area comes from North America.

Methods

We included randomised controlled trials (RCTs, individual or cluster design) and controlled prospective studies (CPSs) that reported the evaluation of CTC programmes — identified as communities that adopt a CTC coalition to prevent substance abuse — targeting individuals or groups in comparison with a control condition (no intervention or other preventative intervention to prevent substance use by young people (12-25 years old)). We also included quasi-experimental designs (QEDs), for example before-and-after studies, as well as reports of evaluations of CTC programmes. The types of outcome measures considered were the following:

Primary outcomes:

- reduction in incidence and prevalence of alcohol and other drug use among young people;
- communities' enhanced ability in adopting, implementing with fidelity and sustaining tested and effective prevention and early intervention programmes.

Secondary outcomes:

- reduction in delinquency and other problem behaviours among young people.

Search strategy

We searched the following databases on 9 September 2015: the Cochrane Drugs and Alcohol Group's Specialised Register of Trials (9 September 2015); the Cochrane Central Register of Controlled Trials (CENTRAL, issue 9, 2015); MEDLINE (PubMed) (January 1966 to 9 September 2015); EMBASE (embase.com) (January 1974 to 9 September 2015). Detailed searches and included studies are listed in Annexes 1 and 2.

We also searched for ongoing clinical trials and unpublished trials by internet searches on the following sites: ClinicalTrials.gov (www.clinicaltrials.gov); World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) (apps.who.int/trialsearch/). In addition, we included references mentioned in a narrative CTC review in a national report ([1]). All searches included non-English language literature.

([1]) 'Social Crime Preventive Evaluation of Initiatives for the Reduction of Compulsive and Systemic Drug-related Crime (SOCPREV)' (forthcoming). Commissioned by Belspo, the Belgian Science Policy Office (Belspo contract no DR/00/75).

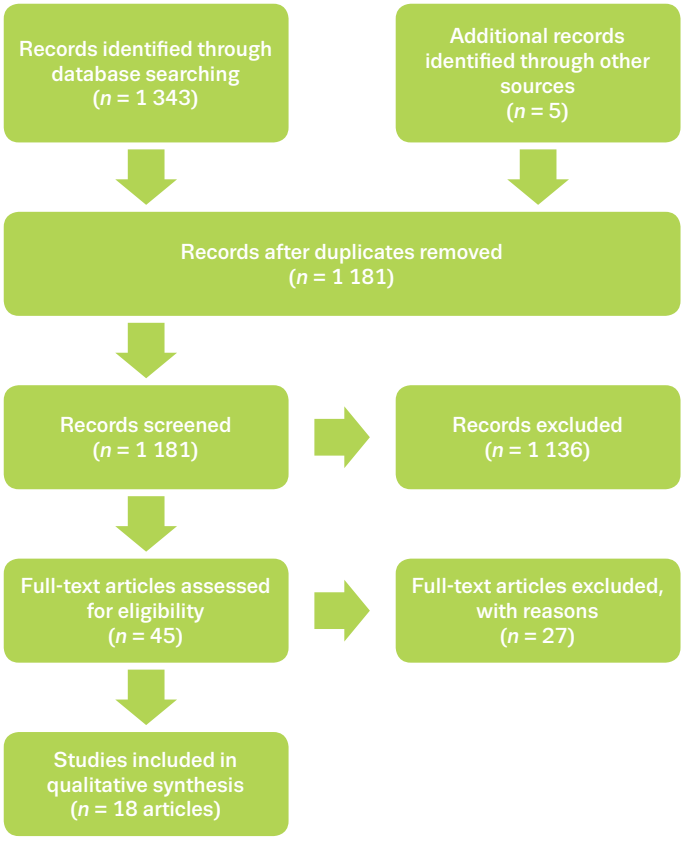
Data collection and analysis

Two authors independently screened the titles and abstracts of studies found using the search strategy described above. Each potentially relevant study was obtained in full-text form and assessed for inclusion independently by two authors. The two authors assessed the extracted data independently and any disagreement was discussed and solved by consensus.

Results

The searches retrieved 1 343 records and five more records were identified through other sources. After duplicates had been removed, 1 181 were considered for inclusion. Of these, 1 136 were excluded on the base of title and abstract and the full-text versions of 45 titles were retrieved for closer inspection. Of these, 27 references were excluded and 18 included. The process of study identification and the results are outlined as a flow diagram in Figure 2 according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) statement (Moher et al., 2009).

FIGURE 2
Selection and inclusion of studies (PRISMA flow diagram)



Characteristics of excluded studies

We excluded 27 reports of studies that did not meet the inclusion criteria; details of these are included in the section 'Characteristics of excluded studies' in Annex 3.

Characteristics of included studies

We found two RCTs, one conducted in Australia (Shakeshaft et al., 2014) and the other (Hawkins et al., 2008b) conducted in the US. The latter gave rise to 12 reports that investigated the same sample at different follow-up points or considered different outcomes or specific subsamples (Hawkins et al., 2008c, 2009, 2012, 2014; Kim et al., 2014; Kuklinski et al., 2012, 2015; Oesterle et al., 2010, 2015; Rhew et al., 2016; Shapiro et al., 2013; Van Horn et al., 2014).

Of the remaining four studies, one was a before-and-after study (Crow et al., 2004), two were quasi-experimental longitudinal studies with a comparison group (Feinberg et al., 2007, 2010) and one was a report of international organisations published by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) (Burkhart, 2013).

The RCTs were of good quality and in accordance with the criteria developed by the Cochrane Collaboration for the assessment of risk of bias in RCTs (Higgins and Green, 2011). It was impossible to assess the methodological quality of the remaining studies because of the type of study design used.

Summary of main results

Our analysis is limited by the lack of a meta-analysis. Studies differed in the measurement of outcomes, the method of statistical analysis used and the quality of reporting; therefore, a pooled analysis was not feasible. We therefore described the main findings of the RCTs, stratified by the length of follow-up, in terms of the effectiveness of the programme (see Annex 1 for a full description of the measures of effectiveness), whereas the results of the other studies were described with the aim of highlighting limitations in their transferability.

Intervention effect

Community Youth Development Study

The first randomised controlled community trial of the CTC system was the Community Youth Development Study (CYDS) developed in the US (Hawkins et al., 2008b). This trial was designed to investigate whether or not the CTC system reduced levels of risk, increased levels of protection and reduced the

incidence and prevalence of substance use (tobacco, alcohol and other drugs) and delinquency in early adolescence. There were 24 matched communities in the CYDS from the states of Colorado, Illinois, Kansas, Maine, Oregon, Utah and Washington. Communities were matched within each state by population size, levels of poverty, racial/ethnic diversity, levels of unemployment and crime indices. One community from each pair was randomised by tossing a coin to intervention (CTC) or control conditions. Communities assigned to the intervention were asked to focus their prevention measures on young people aged 10-14 (grades 5-8 in the US school system, which corresponds to years 6-9 in the English system) and their families. Repeated annual measurements were taken for a panel of students who were in grade 5 (10-11 years old) at the outset. A total of 4 407 fifth-grade students were surveyed annually until they reached grade 12.

One and a half years from the start of the implementation of tested and effective programmes, the results showed that mean levels of targeted risks for the students — now in grade 7 (aged 12-13) — were significantly lower in CTC communities than in control communities (Hawkins et al., 2008c). Significantly, fewer students in CTC communities than in control communities had initiated delinquent behaviour between grades 5 and 7 (10-13 years old). No significant effect of the intervention on the start of substance use was observed by the spring of grade 7. For the same follow-up period, another study (Shapiro et al., 2013) aimed to determine whether or not the effect of CTC on the community-wide adoption of tested and effective programmes and policies varied significantly between communities. Community adoption scores were assessed using a 0-5 scale, with higher scores indicating a greater extent of community adoption of science-based prevention. For intervention communities, community adoption scores ranged from 1.87 to 3.73 (mean = 2.80, SD = 0.55), which indicates that, although all intervention community leaders reported that their communities collected and analysed data on risk and protective factors, evidence-based preventative interventions were not used in all intervention communities.

Three years from implementation, another wave of data were collected and analysed; this has been described in four published articles. Hawkins et al. (2009) showed that the incidences of initiation of alcohol, cigarette and smokeless tobacco use and of the start of delinquent behaviour were significantly lower in CTC than in control communities for students in grades 5-8 (corresponding to 10-14 years of age). In grade 8, the prevalence of alcohol and smokeless tobacco use in the last 30 days and binge drinking in the last 2 weeks and the number of different delinquent behaviours committed in the last year were significantly lower among students in CTC communities.

Kim et al. (2014) examined the effect of CTC programmes with respect to 15 protective factors, using data from the panel of 4 407 students in intervention and control communities who were followed from grade 5 to grade 8. For all protective factors, the study found significantly higher levels of overall protection in CTC than in control communities. Analyses by domain found significantly higher levels of protection in CTC communities than in controls in the community, school and peer/individual domains, but not in the family domain. Furthermore, significantly higher levels of opportunities for pro-social involvement in schools, interaction with pro-social peers and social skills were observed among young people in CTC communities than in those in control communities.

Oesterle et al. (2010) examined whether or not there were gender differences for the effects of CTC on the prevalence of substance use and the variety of delinquent behaviours, and whether or not the effects held equally for risk-related subgroups defined by early substance use, early delinquency and high levels of community-targeted risk at baseline. Data for 4 407 students who were followed from grade 5 to grade 8 in the 24 communities in the study were analysed. The results showed that the effect of CTC on reducing substance use in grade 8 was stronger for boys than for girls and that the impact of CTC on reducing eighth-grade delinquency was stronger for students who had not shown deviant behaviour previously.

One cost-benefit analysis (Kuklinski et al., 2012) reported that, under conservative cost assumptions, the net benefit projected for the participants of CTC interventions during the intervention's lifetime was USD 5 250 per young person, which included USD 812 from the prevention of cigarette smoking and USD 4 438 from the prevention of delinquency. Benefits were monetised and included factors such as potentially increased earnings, decreases in medical expenses and reduced criminal justice system costs. The net present value (discounted benefit minus cost per young person) was positive, indicating that the return per dollar invested was positive, namely a return of USD 5.30 for each dollar invested. The benefits from lowered levels of initiation of alcohol use, as well as the inclusion of broader quality-of-life gains, would further increase CTC's cost-benefit ratio.

At 6 years following implementation, Hawkins et al. (2012) assessed levels of risk, incidence and prevalence of tobacco, alcohol and other drug use, delinquency and violent behaviour among 10th-grade students. The results showed that mean levels of targeted risks increased less rapidly between grades 5 and 10 (corresponding to age 10-15) in CTC than in control communities and were significantly lower in CTC than in control communities. The incidence of delinquent behaviour, alcohol use, cigarette use and the prevalence of current cigarette use and past-year delinquent and violent behaviour were significantly lower in CTC than in control communities in grade 10 (age 15-16).

Van Horn et al. (2014) investigated the degree to which the CTC system affects the probability that adolescents engage in specific behavioural profiles of substance use, delinquency and violence for eighth and 10th graders. In the cross-sectional 2010 data, there was no effect of intervention on the probability of experimenting with substances or of substance use coupled with delinquent activities for either grade. However, 10th graders in intervention communities were significantly less likely to be alcohol users than those in control communities, with OR 0.69 (95 % CI 0.48 to 1.00) ([2]).

Another cost-benefit analysis (Kuklinski et al., 2015) was based on a cost-benefit software tool developed by the Washington State Institute for Public Policy (WSIPP) to help policymakers understand which programmes are effective in improving public outcomes and what return on investment taxpayers could expect from investing public money in these interventions. This study reported that the net value of CTC 5 years from implementation was positive, ranging from USD 1.749 to USD 3.920 per young person. The cost-benefit ratio varied from USD 4.23 to USD 8.22 per dollar invested. Therefore, this study concluded that CTC is a cost-beneficial system for reducing delinquency, underage drinking and tobacco use initiation in young people at a community-wide scale and, last but not least, that the economic gain to society from CTC is substantial.

At 8 years following implementation, Hawkins et al. (2014) assessed sustained abstinence and cumulative incidence and current prevalence of tobacco, alcohol and other drug use, delinquency and violence in 12th-grade students (aged 17-18 years). The results showed that, by the spring of grade 12, students in CTC communities were more likely to have abstained from any drug use, drinking alcohol, smoking cigarettes and engaging in delinquency than students in control communities. They were also less likely to have committed a violent act. There were no significant differences between the groups in targeted risks, the prevalence of past-month or past-year substance use, or past-year delinquency or violence.

The results from subgroup analysis by gender (Oesterle et al., 2015) indicated that males in CTC communities, compared with males in control communities, were significantly more likely to have abstained from any delinquent behaviour and from using cigarettes. There were no statistically significant sustained effects of CTC on abstinence and incidence of substance use or for delinquency among females at age 19. CTC did not have a statistically significant effect in the desired direction on other specific primary or secondary outcomes for males or females. Subgroup analysis by gender revealed, however, three significant effects in favour of the control communities: prevalence of ecstasy use in the past month and past year for females and receiving money or drugs in exchange for sex in the past year for males.

A recent analysis (Rhew et al., 2016) examined whether or not similar intervention effects could be observed using a repeated cross-sectional design in the same sample. Cross-sectional samples of sixth, eighth and 10th graders were surveyed in four waves. Two-stage analysis of covariance (ANCOVA) was used to estimate the differences between CTC and control communities in community-level prevalence of problem behaviours for each grade, adjusting for baseline prevalence. No statistically significant reductions in the prevalence of problem behaviours were observed at any grade in CTC compared with control communities. Secondary analyses examined intervention effects within a 'pseudo-cohort', in which cross-sectional data were used from sixth graders at baseline and 10th graders 4 years later. When examining effects within the pseudo-cohort, the results from CTC compared with control communities showed a significantly slower increase for grades 6-10 in lifetime smokeless tobacco use, but not for other outcomes. Exploratory analyses showed significantly slower increases in lifetime problem behaviours within the pseudo-cohort for CTC communities with high, but not low, prevention programme saturation levels compared with control communities. Although effects of CTC could be demonstrated using a longitudinal panel from the same community-randomised trial, the study did not find similar effects for problem behaviours using a repeated cross-sectional design. These differences may be the result of a reduced ability to detect effects because of potential cohort effects, accretion of those who were not exposed and attrition of those who were exposed to CTC programming in the repeated cross-sectional sample.

Pennsylvania Youth Survey (PAYS)

Two longitudinal studies analysed data from a surveillance survey through the Pennsylvania Youth Survey (PAYS). Feinberg et al. (2007) compared risk factors and outcomes (substance use and delinquency) for CTC compared with non-CTC communities. The results showed that the CTC communities had lower rates of some risk factors and outcomes than would be expected by chance for sixth-grade students.

Feinberg et al. (2010) utilised multilevel models to examine the impact of CTC on changes in risk/protective factors, grades,

([2]) OR: odds ratio. The odds ratio is a way of comparing whether the probability of a certain event is the same between two groups. Like the relative risk, an OR equal to 1 implies that the event is equally probable in both groups. An OR greater than 1 implies that the event is more likely in the first group. An OR less than 1 implies that the event is less likely in the first group. In medical research, the OR is commonly used for case-control studies, as odds, but not probabilities, are usually estimated. Relative risk is used in RCTs and cohort studies. For an example, see 'Treatment options for opioid users', available online: http://www.emcdda.europa.eu/best-practice/treatment/opioid-users

delinquency and substance use over time. The results showed that young people in CTC communities demonstrated lower increases in delinquency, but not substance use, than young people in non-CTC communities. The 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 programmes than in comparison grade-cohorts.

Alcohol Action in Rural Communities (AARC) project

Shakeshaft et al. (2014) reported the results of a cluster RCT comprising 20 communities in Australia that had populations of 5 000-20 000, were at least 100 km from an urban centre and were not involved in another community alcohol project. Data were routinely collected for the entire study period (2001-2009). There was insufficient evidence to conclude that the interventions were effective in the experimental, relative to the control, communities for alcohol-related crime, traffic incidents and hospital inpatient admissions, or for rates of risky alcohol consumption and hazardous/harmful alcohol use. Although respondents in the experimental communities reported statistically significantly lower average weekly consumption (1.90 fewer standard drinks per week, 95 % CI –3.37 to –0.43, $p = 0.01$) and less alcohol-related verbal abuse (OR = 0.58, 95 % CI 0.35 to 0.96, $p = 0.04$) post intervention, the low survey response rates (40 % and 24 % for the pre- and post-intervention surveys, respectively) mean that the results must be interpreted conservatively. The main limitations of this study are as follows: (1) the study may have been underpowered and therefore was not able to detect statistically significant differences in routinely collected data outcomes, and (2) the low survey response rates. The authors concluded that the RCT provided little evidence that community action significantly reduces risky alcohol consumption and alcohol-related harms, although there were potential reductions in self-reported average weekly consumption and experience of alcohol-related verbal abuse. Complementary legislative action may be required to reduce alcohol harms more effectively.

Assessment of the transferability to Europe

Crow et al. (2004) evaluated the impact of CTC by measuring changes in the risk and protective factors before and after intervention in the three UK areas where CTC was taking place. Results were presented separately for each area. In Southside (a Welsh city of fewer than 250 000 inhabitants), 14 out of 20 tests showed a positive effect for the CTC area. The effects were strongest for community and family factors, for which the young people in the CTC community showed most decrease in risk and there was the most CTC-related activity. Individual and peer factors showed a general trend of an increase in risk in both CTC and non-CTC areas, but the CTC young people showed less of an increase than the non-CTC young people. If, as the analysis suggests, trends of increasing risk in the larger context continue, then CTC might have an inhibitory effect, particularly on attitudes and early involvement in problem behaviour, but probably not on feelings of social exclusion or rebellious attitudes.

In Westside (a West Midlands city with a population of approximately 300 000), the picture was a complicated one. First, there was not one clearly defined neighbourhood for the initiative, but three separate communities, which were not contiguous and had separate identities; one of these communities was redeveloped during the intervention period. Second, CTC took place as part of more general area coordination work and other initiatives, so that it became intertwined with these rather than being a single clearly identifiable intervention.

In Northside (a semi-rural city in the north of England with a population of approximately 225 000), there was no significant change in the levels of risk and protection across the CTC area. After an early and promising start, the project struggled to sustain momentum, especially after the consecutive loss of coordinators. Much of the action plan was not implemented in this area.

An EMCDDA study (Burkhart, 2013) aimed to assess whether or not North American evidence-based prevention programmes are feasible in European cultures and contexts. The report included some of the studies already described above (Crow et al., 2004; Feinberg et al., 2007, 2010; Hawkins et al. 2008a,b, 2009, 2012; Oesterle et al., 2010, 2015), in addition to reports of current implementation of CTC in Germany, Croatia and the Netherlands.

A pilot CTC project was launched in two city districts and four rural towns in Lower Saxony in Germany. Similar projects involving 12 local communities are ongoing in Croatia (in cities of various sizes) and, over the past two decades, in 20 cities in the Netherlands.

The number of participants cannot be estimated because of the CTC focus on communities. The report highlights that the main social difference between Europe and the US, as reported by all CTC implementers, is that the concept of 'community' is different in different contexts. For instance, in the Netherlands and Germany, many of the CTC coalition participants are paid professionals, while in the US and Croatia the programmes are mostly carried out by volunteers. The levels of tolerance of underage drinking or early sexual activity and attitudes to smoking, drug use and dropping out of school are also different. It seems that, compared with the US, the CTC sites in Europe are less rural and more heterogeneous

and disadvantaged neighbourhoods are not as poor and their residents not as socially excluded. In Croatia, especially, the communities enrolled in CTC are mostly in well-developed and economically secure tourist areas. In the more densely populated European countries, communities are generally less self-contained and the inhabitants more mobile; therefore, community norms and restrictions on the availability of alcohol and tobacco may have less impact. A final difference is that school systems in the European sites are not as community organised as those in the US, although, more recently, European schools are starting to follow this trend.

The main problems encountered by CTC implementers in Europe were that there are only a limited number of evidence-based prevention programmes and that Europeans are less familiar with the concept of prevention programmes and their implementation than North Americans. According to the report, the European users of CTC learned that it is important to consult with different stakeholders over longer periods than envisaged by the original CTC concept and to record their experiences with CTC and what they would change about it. This proved to be very useful to assess which US components could be directly implemented in Europe and which had to undergo major adjustments.

A recent review of CTC programmes in Europe (Axford et al., 2016) aimed to identify programmes that have been tested and found effective in Europe. The authors searched in databases and the wider literature for RCTs and QEDs, evaluated them and set up an online database for future use. A total of 243 potentially relevant programmes were identified. Of these, 92 met the inclusion criteria and were reviewed in full. Two thirds of these originate in Europe (particularly the United Kingdom and Germany), with one third being imported (mostly from the US). Once a programme has been imported, it is usually evaluated in several countries, but there is relatively little exchange of programmes between European countries. There is also a very uneven distribution of programme evaluations across Europe: most programmes were evaluated in only three countries (Germany, the Netherlands and the United Kingdom), whereas in 10 countries there were no studies meeting the inclusion criteria. Half of the programmes involved a universal element, either in whole or in part, meaning that the other programmes were targeted only. Most programmes were clustered for middle childhood and adolescence, with far fewer targeting either infants or young people transitioning to adulthood. Behavioural outcomes were the most commonly targeted (two thirds of programmes), with more modest numbers focusing on outcomes in the emotional well-being, education and positive relationships domains. Less than 10 % of the programmes reviewed focused on physical health outcomes. Programmes were most likely to target risk and protective factors at the individual/peer and family levels, and were unlikely to focus on factors in the community and economic domains.

In terms of evidence ratings, about one in five of the 92 programmes were considered to be worth implementing based on their impact and the quality of the evaluation. One in 20 should, arguably, be avoided given the lack of positive evidence for their effectiveness. The remaining three quarters of programmes looked promising but arguably needed further testing because the results were not yet compelling. The distribution of programmes among these three levels was broadly the same for imported and home-grown programmes, although some differences emerged; for example, imported programmes were more likely to reach the very highest level, whereas, in the 'promising but test further' category, home-grown programmes were more likely than imported programmes to demonstrate a broadly positive effect. When programme ratings were mapped on to the age groups and outcome categories targeted, it was apparent that the distribution of 'implement' and 'test further' programmes, which are the types of programme that commissioners are likely to be interested in, was very uneven. For some age-outcome combinations, there appear to be no programmes to choose from, and for many others the choice is very limited. The greatest choice is in the outcome area of behaviour and for middle childhood and adolescence in particular.

An overview of the papers and reports identified for this review, describing the objectives and results in more detail can be found in Annex 1.

Conclusions

Community coalitions are a strategy to coordinate activities and resources to prevent adolescent substance use and delinquent behaviour. Community coalitions have been advocated as a mechanism for mobilising communities to engage in prevention and health promotion initiatives, because they can bring together diverse community stakeholders to address a shared goal.

CTC is a coalition-based prevention system that activates community stakeholders to collaborate on the development and implementation of a science-based community prevention system.

The present review includes reports of two RCTs, one in the US and one in Australia, and one US-based quasi-experimental longitudinal study.

Results from a community-randomised trial of CTC conducted in the US support the CTC theory. The trial found that CTC lowered targeted risks for problem behaviour and reduced the incidence and prevalence of delinquency and substance use in seventh- and eighth-grade students (corresponding

to 12-14 years of age) in a sample of young people who had been followed since fifth grade and for 4 years following the implementation of CTC. These reductions continued 2 years later in 10th grade, that is, 6 years after the initial implementation and 8 years after implementation of CTC in communities and 3 years after study-provided technical assistance and resources ended. However, CTC did not result in reductions in levels of risk or the prevalence of current drug use or delinquent and violent behaviour in grade 12. In the US, targeting preventative interventions during middle school, a developmentally sensitive time for drug use and delinquency initiation, appears to have prevented the onset of alcohol and tobacco use, delinquency and violence in the panel during high school. However, continued preventative interventions during high school may be needed to lower the current prevalence of substance use, delinquency and violence among those who have initiated these behaviours.

The RCT conducted in Australia provided little evidence that community action significantly reduces risky alcohol consumption and alcohol-related harms, other than potential reductions in self-reported average weekly consumption and experience of alcohol-related verbal abuse. Because the study was underpowered, it is not possible to determine whether this was because the programme had no effect or because of insufficient sample size. The authors suggest that complementary legislative action may be required to reduce alcohol harms more effectively.

These two trials, conducted in very different contexts, do not provide conclusive evidence regarding the effectiveness of CTC, although they do strongly suggest a positive effect. However, an urgent replication of the evaluation would be called for in a new context, such as Europe, in order to gather new data and draw conclusions about effectiveness and transferability.

If no trials have been conducted in Europe to assess the effectiveness of the method, some pilot implementations could provide useful data to assess the transferability of the programme. This, in turn, can be used as a basis for the design of a European effectiveness trial.

In the United Kingdom, implementations of CTC in three different cities in England in 2004 had a variable impact in community cohesion and cooperation, depending on the pre-existing structural and social resources of the sites. People in some coalitions were reluctant, uncomfortable and not used to cooperating, especially those in the more disadvantaged areas with less infrastructure.

Raw and scarce data are available for the implementation of CTC in other European countries; the studies are still ongoing, but the available results are controversial.

Starting from these few data, the essential elements of CTC, its protocol and the five phases of implementation, appear to fit well with European communities. There is a need to adapt the organisation of the programme, for example to professional coalitions instead of volunteer-dominated coalitions and to European school systems that are usually not as community organised as they are in the US. Additionally, prevention practice will benefit from research that includes process and programme fidelity as instrumental variables in RCTs. This way, diverging implementation contexts can be assessed more systematically, allowing for in-depth multisite and cross-country analysis that will, in turn, improve the quality of future implementations.

In conclusion, the CTC programme has proved to be a useful preventative intervention in North America, but its effectiveness still needs to be clearly assessed in Europe. This would require the implementation of a sufficiently robust randomised study and adapting the programme to suit European culture (in its narrow sense) by adjusting implementation, wording, images and examples to European local settings, norms and values.

Description of a CTC

CTC approaches aim to bring all the stakeholders in a community together; these include elected officials, young people and parents, those involved in law enforcement, schools, public health officials, agencies and organisations serving local young people and families, the faith community, the business community and the residents.

All stakeholders set the priorities on the basis of factual data to discuss the strengths and weaknesses of their community and to set measurable goals.

This approach emphasises that no single entity can ensure the optimal development of the younger population. An African proverb says, 'it takes a village to raise a child'; the CTC involves all the community actors, the service providers and the residents to build a healthy and secure environment for young people and their families.

The providers of prevention interventions are considered in their social context and the target population is addressed at individual and social levels. The targets of the interventions are the families, the group of peers, the schools and the individual young people.

Where to find the resources to implement CTC?

Name	Location	Where to download the resources
Steps to Success	Montebello, Colorado, US	https://www.360communities.org/event/steps-for-success/
Communities That Care	Substance Abuse and Mental Health Services Administration, US	http://store.samhsa.gov/product/Communities-That-Care-Curriculum/PEP12-CTCPPT
Communities That Care for Europe	Dartington (United Kingdom)	http://dartington.org.uk/projects/view/14
	Crime Prevention Council of Lower Saxony (Germany)	http://www.communitiesthatcare.org.au/ctc-communities/registered-communities/communities-care-europe
	Verwey-Jonker Institute (Netherlands)	
	Seinpost Adviesbuero (Netherlands)	
	University of Applied Sciences, Leiden (Netherlands)	
	Institute for the Prevention of Addictions and Drug Abuse (Austria)	
	City of Malmö (Sweden)	
	University of Cyprus (Cyprus)	
	University of Zagreb (Croatia)	
Communities That Care	Australia	http://www.communitiesthatcare.org.au/
Communities That Care	Germany	http://www.ctc-info.de/nano.cms/downloads
Communities That Care	Canada	http://cbpp-pcpe.phac-aspc.gc.ca/interventions/communities-that-care/

References

Included studies

1. Burkhart, G. (2013), *North American drug prevention programs: are they feasible in European cultures and contexts?*, European Monitoring Centre for Drugs and Drug Addiction, Publications Office of the European Union, Luxembourg.
2. Crow, I., France, A., Hacking, S. and Hart, M. (2004), *Does Communities that Care work? An evaluation of a community-based risk prevention programme in three neighborhoods*, Joseph Rowntree Foundation, York.
3. Feinberg, M.E., Greenberg, M.T., Osgood, D.W., Sartorius, J. and Bontempo, D. (2007), 'Effects of the Communities That Care model in Pennsylvania on youth risk and problem behaviors', *Prevention Science* 8(4), pp. 261-270.
4. Feinberg, M.E., Jones, D., Greenberg, M.T., Osgood, D.W. and Bontempo D. (2010), 'Effects of the Communities That Care model in Pennsylvania on change in adolescent risk and problem behaviors', *Prevention Science* 11(2), pp. 163-171.
5. Hawkins, J.D., Catalano, R.F., Arthur, M.W., Egan, E., Brown, E.C., Abbott, R.D. and Murray, D.M. (2008b), 'Testing Communities That Care: the rationale, design and behavioral baseline equivalence of the community youth development study', *Prevention Science* 9(3), pp. 178-190.
6. Hawkins, J.D., Brown, E.C., Oesterle, S., Arthur, M.W., Abbott, R.D. and Catalano, R.F. (2008c), 'Early effects of Communities That Care on targeted risks and initiation of delinquent behavior and substance use', *Journal of Adolescent Health*, 43(1), pp. 15-22.
7. Hawkins, J.D., Oesterle, S., Brown, E.C., Arthur, M.W., Abbott, R.D., Fagan, A.A. and Catalano, R.F. (2009), 'Results of a type 2 translational research trial to prevent adolescent drug use and delinquency: a test of Communities That Care', *Archives of Pediatrics & Adolescent Medicine* 163(9), pp. 789-798.
8. Hawkins, J.D., Oesterle, S., Brown, E.C., Monahan, K.C., Abbott, R.D. and Arthur, M.W. (2012), 'Sustained decreases in risk exposure and youth problem behaviors after installation of the Communities That Care prevention system in a randomized trial', *Archives of Pediatrics & Adolescent Medicine* 166(2), pp. 141-148.
9. Hawkins, J.D., Oesterle, S., Brown, E.C., Abbott, R.D. and Catalano, R.F. (2014), 'Youth problem behaviors 8 years after implementing the Communities That Care prevention system: a community-randomized trial', *JAMA Pediatrics* 168(2), pp. 122-129.
10. Kim, B.K., Gloppen, K.M., Rhew, I.C., Oesterle, S., Hawkins, J.D. (2014), 'Effects of the Communities That Care prevention system on youth reports of protective factors', *Prevention Science*, 16(5), pp. 652-662.
11. Kuklinski, M.R., Briney, J.S., Hawkins, J.D. and Catalano, R.F. (2012), 'Cost-benefit analysis of Communities That Care outcomes at eighth grade', *Prevention Science* 13(2), pp. 150-161.
12. Kuklinski, M.R., Fagan, A.A., Hawkins, J.D., Briney, J.S. and Catalano, R.F. (2015), 'Benefit-cost analysis of a randomized evaluation of Communities That Care: monetizing intervention effects on the initiation of delinquency and substance use through grade 12', *Journal of Experimental Criminology* 11(2), pp. 165-192.
13. Oesterle, S., Hawkins, J.D., Fagan, A.A., Abbott, R.D. and Catalano, R.F. (2010), 'Testing the universality of the effects of the Communities That Care prevention system for preventing adolescent drug use and delinquency', *Prevention Science* 11(4), pp. 411-423.
14. Oesterle, S., Hawkins, J.D., Kuklinski, M.R., Fagan, A.A., Fleming, C., Rhew, I.C., Brown, E.C. et al. (2015), 'Effects of Communities That Care on males' and females' drug use and delinquency 9 years after baseline in a community-randomized trial', *American Journal of Community Psychology* 56(3-4), pp. 217-28.
15. Rhew, I.C., Monahan, K.C., Oesterle, S. and Hawkins, J.D. (2016), 'The Communities That Care brief depression scale: psychometric properties and criterion validity', *Journal of Community Psychology* 44(3), pp. 391-398.

16. Shakeshaft, A., Doran, C., Petrie, D., Breen, C., Havard, A., Abudeen, A., Harwood, E. et al. (2014), 'The effectiveness of community action in reducing risky alcohol consumption and harm: a cluster randomised controlled trial', *PLoS Medicine* 11(3), p. e1001617.

17. Shapiro, V.B., Hawkins, J.D., Oesterle, S., Monahan, K.C., Brown, E.C. and Arthur, M.W. (2013), 'Variation in the effect of Communities That Care on community adoption of a scientific approach to prevention', *Journal of the Society for Social Work and Research* 4(3).

18. Van Horn, M.L., Fagan, A.A., Hawkins, J.D. and Oesterle, S. (2014), 'Effects of the Communities That Care system on cross-sectional profiles of adolescent substance use and delinquency', *American Journal of Preventive Medicine* 47(2), pp. 188-197, doi:10.1016/j.amepre.2014.04.004.

Excluded studies

Arthur, M.W., Hawkins, J.D., Brown, E.C., Briney, J.S., Oesterle, S. and Abbott, R.D. (2010), 'Implementation of the Communities That Care prevention system by coalitions in the community youth development study', *Journal of Community Psychology*, 38(2), pp. 245-258.

Basic, J. (2015), 'Community mobilization and readiness: planning flaws which challenge effective implementation of "Communities that care" prevention system', *Substance Use & Misuse* 50(8-9), pp. 1083-1088.

Briney, J.S., Brown, E.C., Hawkins, J.D. and Arthur, M.W. (2012), 'Predictive validity of established cut points for risk and protective factor scales from the Communities That Care youth survey', *Journal of Primary Prevention* 33(5-6), pp. 249-258.

Brown, E.C., Hawkins, J.D., Arthur, M.W., Briney, J.S. and Abbott, R.D. (2007), 'Effects of Communities That Care on prevention services systems: findings from the community youth development study at 1.5 years', *Prevention Science* 8(3), pp. 180-191.

Brown, E.C., Graham, J.W., Hawkins, J.D., Arthur, M.W., Baldwin, M.M., Oesterle, S., Briney, J.S. et al. (2009), 'Design and analysis of the Community Youth Development Study longitudinal cohort sample', *Evaluation Review* 33(4), pp. 311-334.

Brown, L.D., Feinberg, M.E. and Greenberg, M.T. (2010), 'Determinants of community coalition ability to support evidence-based programs', *Prevention Science* 11(3), pp. 287-297.

Brown, E.C., Hawkins, J.D., Arthur, M.W., Briney, J.S. and Fagan, A.A. (2011), 'Prevention service system transformation using Communities That Care', *Journal of Community Psychology* 39(2), pp. 183-201.

Brown, E.C., Hawkins, J.D., Rhew, I.C., Shapiro, V.B., Abbott, R.D., Oesterle, S., Arthur, M.W. et al. (2014), 'Prevention system mediation of Communities That Care effects on youth outcomes', *Prevention Science* 15(5), pp. 623-632.

Brown, L.D., Feinberg, M.E., Shapiro, V.B. and Greenberg, M.T. (2015), 'Reciprocal relations between coalition functioning and the provision of implementation support', *Prevention Science* 16(1), pp. 101-109.

Fagan, A.A., Hanson, K., Hawkins, J.D. and Arthur, M. (2009), 'Translational research in action: implementation of the Communities That Care prevention system in 12 communities', *Journal of Community Psychology* 37(7), pp. 809-829.

Fagan, A.A., Arthur, M.W., Hanson, K., Briney, J.S. and Hawkins, J.D. (2011), 'Effects of Communities That Care on the adoption and implementation fidelity of evidence-based prevention programs in communities: results from a randomized controlled trial', *Prevention Science* 12(3), pp. 223-234.

Fagan, A.A., Hanson, K., Briney, J.S. and Hawkins J.D. (2012), 'Sustaining the utilization and high quality implementation of tested and effective prevention programs using the Communities That Care prevention system', *American Journal of Community Psychology*, 49(3-4), pp. 365-377.

Gloppen, K.M., Arthur, M.W., Hawkins, J.D. and Shapiro, V.B. (2012), 'Sustainability of the Communities That Care prevention system by coalitions participating in the Community Youth Development Study', *Journal of Adolescent Health* 51(3), pp. 259-264.

Harachi, T.W., Ayers, C.D., Hawkins, J.D., Catalano, R.F. and Cushing, J. (1996), 'Empowering communities to prevent adolescent substance abuse: process evaluation results from a risk- and

protection-focused community mobilization effort', *Journal of Primary Prevention* 16(3), pp. 233-254.

Hemphill, S.A., Toumbourou, J.W., Herrenkohl, T.I., McMorris, B.J. and Catalano, R.F. (2006), 'The effect of school suspensions and arrests on subsequent adolescent antisocial behavior in Australia and the United States', *Journal of Adolescent Health* 39(5), pp. 736-744.

Jones, L., Hughes, K., Atkinson, A.M. and Bellis, M.A. (2011), 'Reducing harm in drinking environments: a systematic review of effective approaches', *Health & Place* 17(2), pp. 508-518.

Jonkman, H.B., Haggerty, K.P., Steketee, M., Fagan, A., Hanson, K. and Hawkins, J.D. (2009), 'Communities That Care, core elements and context: research of implementation in two countries', *Social Development Issues* 30(3), pp. 42-57.

Kuklinski, M.R., Hawkins, J.D., Plotnick, R.D., Abbott, R.D. and Reid, C.K. (2013), 'How has the economic downturn affected communities and implementation of science-based prevention in the randomized trial of Communities That Care?', *American Journal of Community Psychology* 51(3-4), pp. 370-384.

Monahan, K.C., Hawkins, J.D. and Abbott, R.D. (2013), 'The application of meta-analysis within a matched-pair randomized control trial: an illustration testing the effects of Communities That Care on delinquent behavior', *Prevention Science* 14(1), pp. 1-12.

Morojele, N.K., Muller, M., Reddy, P., Lombard, C.J., Flisher, A.J. and Ziervogel, C.F. (2002), 'Measurement of risk and protective factors for drug use and anti-social behavior among high school students in South Africa', *Journal of Drug Education* 32(1), pp. 25-39.

Murray, D.M., Van Horn, M.L., Hawkins. J.D. and Arthur, M.W. (2006), 'Analysis strategies for a community trial to reduce adolescent ATOD use: a comparison of random coefficient and ANOVA/ANCOVA models', *Contemporary Clinical Trials* 27(2), pp. 188-206.

Oesterle, S., Hawkins, J.D., Fagan, A.A., Abbott, R.D. and Catalano, R.F. (2014), 'Variation in the sustained effects of the Communities That Care prevention system on adolescent smoking, delinquency, and violence', *Prevention Science* 15(2), pp. 138-145.

Quinby, R.K., Hanson, K., Brooke-Weiss, B., Arthur, M.W., Hawkins, J.D. and Fagan, A.A. (2008), 'Installing the Communities That Care prevention system: implementation progress and fidelity in a randomized controlled trial', *Journal of Community Psychology* 36(3), pp. 313-332.

Scholes-Balog, K.E., Hemphill, S., Reid, S., Patton, G. and Toumbourou, J. (2013), 'Predicting early initiation of alcohol use: a prospective study of Australian children', *Substance Use & Misuse* 48(4), pp. 343-352.

Shapiro, V.B., Oesterle, S., Abbott, R.D., Arthur, M.W. and Hawkins, J.D. (2013), 'Measuring dimensions of coalition functioning for effective and participatory community practice', *Social Work Research* 37(4), pp. 349-359.

Shapiro, V.B., Hawkins, J.D. and Oesterle, S. (2015), 'Building local infrastructure for community adoption of science-based prevention: the role of coalition functioning', *Prevention Science* 16, p. 1136.

Steketee, M., Oesterle, S., Jonkman, H., Hawkins, J.D., Haggerty, K.P. and Aussems, C. (2013), 'Transforming prevention systems in the United States and the Netherlands using Communities That Care Promising prevention in the eyes of Josine Junger-Tas', *European Journal on Criminal Policy and Research* 19(2), pp. 99-116.

Wongtongkam, N., Ward, P.R., Day, A. and Winefield, A.H. (2014), 'The influence of protective and risk factors in individual, peer and school domains on Thai adolescents' alcohol and illicit drug use: a survey', *Addictive Behaviors* 39(10), pp. 1447-1451.

Additional references

Axford, N., Sonthalia, S., Wrigley, Z., Webb, L., Mokhtar, N., Brook, L., Wilkinson, T. et al. (2016), *What works in Europe? Developing a European Communities that Care database of effective prevention programmes*, Dartington Social Research Unit, Dartington, UK.

- Butterfoss, F.D. (2006), 'Process evaluation for community participation', *Annual Review of Public Health* 27, pp. 323-340.
- Catalano, R.F. and Hawkins, J.D. (1996), 'The social development model: a theory of antisocial behavior', pp. 149-197, in Hawkins J.D. (ed.), *Delinquency and crime: current theories*, Cambridge University Press, New York.
- Chinman, M., Hannah, G., Wandersman, A., Ebener, P., Hunter, S.B., Imm, P. and Sheldon, J. (2005), 'Developing a community science research agenda for building community capacity for effective preventive interventions', *American Journal of Community Psychology* 35, pp. 143-157.
- Fagan, A.A., Hawkins, J.D., and Catalano, R.F. (2008), 'Using community epidemiologic data to improve social settings: the Communities That Care prevention system', in Shinn, M. and Yoshikawa, H. (eds), *Changing schools and community organizations to foster positive youth development,* Oxford University Press, New York (available at http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780195327892.001.0001/acprof-9780195327892-chapter-16).
- Faggiano, F., Minozzi, S., Versino, E. and Buscemi, D. (2014), 'Universal school-based prevention for illicit drug use', *Cochrane Database of Systematic Reviews* 12, CD003020, doi: 10.1002/14651858.CD003020.pub3.
- Foster-Fishman, P.G., Berkowitz, S.L., Lounsbury, D.W., Jacobson, S. and Allen, N.A. (2001), 'Building collaborative capacity in community coalitions: a review and integrative framework', *American Journal of Community Psychology* 29, pp. 241-261.
- Green, L., Daniel, M. and Novick, L. (2001), 'Partnerships and coalitions for community-based research', *Public Health Reports* 116, pp. 20-31.
- Haggerty, K.P. and Shapiro, V.B. (2013), 'Science-based prevention through Communities That Care: a model of social work practice for public health', *Social Work in Public Health* 28, pp. 349-365 (available at http://doi.org/10.1080/19371918.2013.774812).
- Hall, W. (2015), 'What has research over the past two decades revealed about the adverse health effects of recreational cannabis use?', *Addiction* 110, pp. 19-35.
- Hawkins, J.D. and Catalano, R.F. (2002), *Investing in your community's youth: an introduction to the Communities That Care system*, Channing Bete Company, South Deerfield, MA.
- Hawkins, J.D. and Weis, J.G. (1985), 'The social development model: an integrated approach to delinquency prevention', *Journal of Primary Prevention* 6, pp. 73-97.
- Hawkins, J.D., Catalano, R.F. and Arthur, M.W. (2002), 'Promoting science-based prevention in communities', *Addictive Behaviors* 27, pp. 951-976.
- Hawkins, J.D., Kosterman, R., Catalano, R.F., Hill, K G. and Abbott, R.D. (2008a), 'Effects of social development intervention in children fifteen years later', *Archives of Pediatric & Adolescent Medicine* 162, pp. 1133-1141.
- Higgins, J.P.T. and Green, S. (eds.) (2011) *Cochrane handbook for systematic reviews of interventions,* version 5.1.0*,* The Cochrane Collaboration (available at www.cochrane-handbook.org).
- Jasuja, G.K., Chou, C.P., Berstein, K., Wang, E., McClure, M. and Pentz, M.A. (2005), 'Using structural characteristics of community coalitions to predict progress in adopting evidence-based prevention programs', *Evaluation and Program Planning* 28, pp. 173-184.
- Kandel, D. and Kandel, E. (2015), 'The Gateway Hypothesis of substance abuse: developmental, biological and societal perspectives', *Acta Paediatrica* 104(2), 130-137, doi: 10.1111/apa.12851.
- Leshner, A.I. (1997), 'Drug abuse and addiction treatment research: the next generation', *Archives of General Psychiatry* 54, pp. 691-694.
- Leshner, A.I. (1999), 'Science-based views of drug addiction and its treatment', *JAMA* 282, pp. 1314-1316.
- van Leeuwen, A.P., Verhulst, F.C., Reijneveld, S.A., Vollebergh, W.A., Ormel, J. and Huizink, A.C. (2011), 'Can the gateway hypothesis, the common liability model and/or, the route of administration model predict initiation of cannabis use during adolescence? A survival analysis — the TRAILS study', *Journal of Adolescent Health* 48, pp. 73-78.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G. and the PRISMA Group (2009), 'Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement', *PLoS Medicine* 6(7), p. e1000097.

Moss, H.B., Chen, C.M. and Yi, H.Y. (2014), 'Early adolescent patterns of alcohol, cigarettes, and marijuana polysubstance use and young adult substance use outcomes in a nationally representative sample', *Drug and Alcohol Dependence* 136, pp. 51-62.

Trenz, R.C., Scherer, M., Harrell, P., Zur, J., Sinha, A. and Latimer, W. (2012), 'Early onset of drug and polysubstance use as predictors of injection drug use among adult drug users', *Addictive Behaviors* 37(4), pp. 367-372.

West, R. (2013), *Models of addiction*, EMCDDA Insights 14, Publications Office of the European Union, Luxembourg.

West, R. and Brown, J. (2013), *Theory of addiction,* 2nd edition, Wiley-Blackwell, London.

Winters, K.C. and Lee, C.Y. (2008), 'Likelihood of developing an alcohol and cannabis use disorder during youth: association with recent use and age', *Drug and Alcohol Dependence* 92(1-3), pp. 239-247.

Annex 1

Overview of included reports

Author (year)	Crow (2004)
Objective	To evaluate the first three CTC projects in the United Kingdom
Study design	Before-and-after design through a school-based self-report survey
Participants	2 233 (31 %) pupils who went to schools serving a CTC project area versus 4 943 (69 %) pupils who went to the same schools, but did not live in the CTC area; the pupils studied lived in three areas: Southside, Westside and Northside
Outcomes	Changes in risk factors after the interventions compared with those before intervention
Results	**Southside** ***High risk for availability of drugs*** Increased, but not significantly, in CTC pupils; increased significantly in non-CTC pupils ***Opportunities for pro-social involvement in activities and sports*** Declined among the CTC pupils (–4.3 %) (no statistically significant difference) and in the non-CTC pupils (–5.3 %, $p < 0.001$) in favour of CTC ***Pro-social involvement, indicating friendly neighbours protection*** Increased in the CTC group (by 8 %, $p < 0.02$) in favour of CTC; the non-CTC group remained the same ***School disorganisation relating to school rules and consistent standards of behaviour*** Risk decreased for CTC pupils, but not significantly, whereas the decrease was significant for non-CTC pupils (–8 %, $p < 0.001$); there were no significant changes in any of the factors relating to the family; the results are in favour of CTC **Westside** No significant change in the levels of risk and protection across the CTC area **Northside** After an early and promising start, the project struggled to sustain momentum, especially after the consecutive loss of coordinators; much of the action plan was not implemented
Conclusions of the authors	Prevention programmes, such as CTC, should undertake regular reviews of their membership to ensure that critical players are fully engaged in the process throughout. Good management systems should be developed to monitor participation. If people are missing or if key members leave, they should be replaced as soon as possible. Structures and systems that ensure that communication and collaboration between the different levels of partnership are addressed early on should be built in to the programme. This will help to maintain consensus and agreement on what is to be done. Prevention projects should develop ongoing induction processes for new volunteers and staff. These should include details of the process, the aims and objectives of the work, and the history of the project. They should be clear and engaging, as new entrants will not have been through the early planning and induction experiences of the set-up phase

Author (year)	Feinberg (2007)
Objective	To compare risk factors and outcomes (substance use and delinquency) in CTC and non-CTC communities
Study design	Longitudinal studies analysed data from a surveillance survey through the Pennsylvania Youth Survey (PAYS)
Participants	38 107 young people in Pennsylvania schools
Outcomes	Evaluation of 15 risk factors in CTC versus non-CTC communities; the risk factors were grouped into several domains following the survey developers: individual, peer, family and school. Six outcome measures: delinquent behaviours in the past year: use of several substances in the past 30 days (alcohol, smoking and smokeless tobacco, marijuana, LSD (lysergic acid diethylamide), cocaine and inhalants); and past 30-day alcohol use, binge drinking, being drunk or high in school and tobacco use
Results	Results favoured the CTC communities at greater than chance levels in terms of lower rates of some risk factors and outcomes ***Results of outcome analysis for full sample of CTC versus non-CTC communities (unstandardised beta coefficients)***

Domain	Risk factor or outcome	Year 2003				Year 2001			
		6th	8th	10th	12th	6th	8th	10th	12th
Individual	Favourable attitudes towards anti-social behaviour	–0.043**	–0.027	0.010	–0.013	–0.006	–0.030	0.006	0.007
	Favourable attitudes towards ATOD use	–0.024**	–0.020	–0.022	–0.052	–0.012	–0.032	0.005	–0.008
	Low perceived risks of drug use	–0.025	–0.013	–0.008	–0.069**	–0.032	–0.012	0.004	0.000
	Early initiation of drug use and ant. behaviour	–0.034	–0.032	–0.046	–0.092*	–0.067	–0.042	0.020	–0.071
	Sensation seeking	–0.084**	–0.025	0.016	0.018	0.028	0.002	0.015	0.003
	Rebelliousness	–0.025	–0.014	0.019	0.003	–0.044	–0.016	0.001	–0.018
School	Low school commitment	–0.042*	–0.006	0.009	0.002	–0.028	–0.069**	–0.006	0.023
	Poor academic performance	–0.001	0.027	–0.012	–0.006	–0.012	–0.075**	0.005	–0.037
Peer	Peer friends' delinquent behaviour	–0.021*	–0.023	–0.034*	–0.039**	–0.018	–0.011	0.004	–0.019
	Friends' use of drugs	–0.028*	–0.019	–0.061	–0.105*	–0.018	–0.037	–0.008	–0.025
	Peer rewards for antisocial behaviour	–0.042**	–0.028	–0.035	–0.004	0.019	–0.050	0.025	–0.004
Family	Family supervision	–0.050**	–0.042*	–0.008	–0.055*	–0.045	–0.050	0.083*	–0.021
	Family discipline	–0.083**	–0.068**	–0.026	–0.054	–0.057	–0.071*	0.075	–0.045
	Family history of antisocial behaviour	–0.056*	–0.055	–0.090**	–0.053	–0.035	–0.011	0.072	–0.092
	Parental attitudes favourable to ATOD use	–0.021**	–0.015	0.006	–0.015	0.002	–0.019	0.051	–0.055
Outcomes	30-day alcohol use	–0.016**	–0.014	–0.031	–0.155*	0.011	–0.021	0.031	–0.048
	30-day cigarette use	–0.010*	–0.014	0.000	0.009	–0.010	–0.028	0.002	–0.106
	2-week prevalence of binge drinking	–0.007	–0.003	–0.023	–0.108*	0.000	–0.017	0.056	–0.002
	12-month prevalence drunk/ high at school	–0.004	0.005	–0.027	–0.027	0.003	0.005	0.059	0.044
	Delinquent behaviour	–0.015**	–0.015	–0.037*	–0.018	–0.002	–0.029**	0.020	0.009
	Drug involvement	–0.001	–0.005	–0.039	–0.058**	–0.009	–0.020	0.008	0.008

Negative coefficient indicates lower risk or problem behaviour in CTC groups vs non-CTC.
*Significant at $p \leq 0.05$
**Significant at $p \leq 0.01$

Conclusions of the authors	Evidence of CTC effects for grade-cohorts that received evidence-based programmes was even stronger.These findings suggest that community coalitions can affect adolescent public health problems at a population level, especially when evidence-based programmes are utilised

Author (year)	Feinberg (2010)
Objective	To compare risk factors and outcomes (substance use and delinquency) in CTC and non-CTC communities
Study design	Longitudinal studies analysed data from a surveillance survey through the Pennsylvania Youth Survey (PAYS)
Participants	98 436 young people in Pennsylvania schools
Outcomes	Valuation of 15 risk factors for CTC versus non-CTC communities; the risk factors have been grouped into several domains following the survey developers: individual, peer, family and school. Six outcome measures: delinquent behaviours in the past year; use of several substances in the past 30 days (alcohol, smoking and smokeless tobacco, marijuana, LSD, cocaine and inhalants); and past 30-day alcohol use, binge drinking, being drunk or high in school and tobacco use
Results	***Effects of CTC and expected-impact CTC on change in risk/protection and substance use***

	Grade x CTC			Grade x expected impact		
	Model	Coefficient	*p*-value	Coefficient	*p*-value	ES
Risk and protective factor indices						
Community cohesion	R	0.0050	0.477	0.0142*	0.029	0.12
Community drug-firearms	R	0.0050	0.477	0.0144*	0.031	0.09
School prosocial	R	–0.0020	0.854	0.0388*	0.000	0.35
Family cohesion	R	0.0035	0.787	0.0211*	0.026	0.16
Family risk	O	0.0131	0.181	–0.0850*	0.001	0.18
Antisocial attitudes/ behaviour	R	0.0044	0.624	–0.0217*	0.009	0.17
Antisocial peer	O	–0.0177	0.448	–0.1117*	0.000	0.27
Academic performance and antisocial behaviour						
Grades last year	O	0.0033	0.856	0.0588*	0.001	0.32
Delinquency	O	–0.0430*	0.049	–0.0621*	0.007	0.19
Substance use — past 30 days						
Alcohol: use vs. no use	L	0.0257	0.331	–0.0211	0.432	–
Alcohol: level of use	O	0.0303	0.255	–0.0251	0.343	–
Cigarette: use vs. no use	L	0.0277	0.300	–0.0075	0.777	–
Marijuana: use vs. no use	L	0.0027	0.935	0.0028	0.283	–
Drunk/high at school (past year)	L	–0.0133	0.704	0.0274	0.446	–

Notes: Grade × CTC indicates the programme × time interaction term; grade × expected impact represents a similar interaction term, but compares expected-impact CTC grade-cohorts with all other grade-cohorts; expected-impact CTC is a subset of CTC
ES, effect size; L, logistic; O, ordinal; R, linear
*$p < 0.05$

Conclusions of the authors	Young people in CTC communities showed lower increases in levels of delinquency, but not in substance use, than young people 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 programmes than comparison grade-cohorts. Community coalitions can affect adolescent risk and protective behaviours at a population level when evidence-based programmes are utilised. CTC represents an effective model for disseminating such programmes

Author (year)	Hawkins (2008a,b)
Objective	Analysis of the rationale, design and behavioural baseline equivalence of the CYDS (Hawkins 2008a). To assess the effects of CTC on reducing levels of targeted risk factors and reducing initiation of delinquent behaviour and substance use in grade 7, 1.67 years following the implementation of preventative interventions that were selected through the CTC process (Hawkins 2008b)
Study design	RCT
Participants	4 407 fifth-grade students were surveyed annually until grade 7
Outcomes	Measures of risk factors (laws and norms favourable towards drug and alcohol use; family management problems; parental attitudes favourable to problem behaviour; family conflict; low commitment to school; academic failure; favourable attitudes to problem behaviour; rebelliousness; friends who engage in problem behaviour), substance use, delinquency and demographic characteristics obtained from the Youth Development Survey. Follow-up: 4 years post-baseline
Results	***Targeted risk factors*** Controlling for grade-5 levels of risk and student and community characteristics, grade-7 risk levels were significantly higher for students in control communities compared with students from CTC communities. The between-group difference in grade 7 corresponded to a standardised intervention effect size of $\delta = 0.15$ (variance $\sigma 2\ \delta = 0.08$). In addition, grade-5 levels of risk, student age and parental education were associated with grade-7 levels of risk. No other background variables were significantly associated with levels of targeted risks in grade 7 ***Onset of delinquent behaviour and substance use*** Analyses found a significant intervention effect on the initiation of delinquent behaviour but no significant effect on substance use initiation. The adjusted odds ratio for the effects of the intervention on delinquent behaviour onset was 1.27, suggesting that students from control communities were 27 % more likely to initiate delinquent behaviour during grades 6 and 7 than were students from CTC communities
Conclusions of the authors	CTC's theory of change hypothesises that it takes between 2 and 5 years to observe community-level effects on risk factors and 5 or more years to observe effects on adolescent delinquency or substance use. The early findings, which agree with the hypothesised effects of CTC on targeted risk factors and initiation of delinquent behaviour, are promising
Author (year)	**Hawkins (2009)**
Objective	See objective for Hawkins (2008a,b) above
Study design	See study design for Hawkins (2008a,b) above
Participants	See participants for Hawkins (2008a,b) above: 4 407 fifth-grade students were surveyed annually until grade 8
Outcomes	Incidence and prevalence of alcohol, tobacco and other drug use and delinquent behaviour by the spring of grade 8. Follow-up: 5 years post baseline
Results	**Incidence (control versus CTC) in grade 8; 95 % CI for all** Alcohol use: OR 1.60 (1.05 to 2.44); in favour of CTC, no statistically significant difference Alcohol use in last 30 days: OR 1.25 (1.04 to 1.52); in favour of CTC Binge drinking last 2 weeks: OR 1.40 (1.07 to 1.84); in favour of CTC Onset of marijuana use: OR 0.96 (0.60 to 1.53); no significant difference Inhalant use: OR 1.12 (0.68 to 1.83); no significant difference **Prevalence (control versus CTC) in grade 8 last 30 days; 95 % CI for all** Alcohol: adjusted odds ratio (AOR) 1.25 (1.04 to 1.52); in favour of CTC Cigarettes: AOR 1.21 (0.92 to 1.58); no significant difference Smokeless tobacco: AOR, 1.79 (1.23 to 2.62); in favour of CTC Inhalants: AOR 1.11 (0.73 to 1.68); no significant difference Marijuana: AOR 1.15 (0.82 to 1.60); no significant difference Prescription drugs: AOR 1.05 (0.72 to 1.52); no significant difference Other illicit drugs: AOR 1.30 (0.88 to 1.92); no significant difference Binge drinking in the last 2 weeks: AOR 1.40 (1.07 to 1.84); in favour of CTC Delinquent behaviours last year: AOR 1.34 (1.20 to 1.49); in favour of CTC
Conclusions of the authors	The CTC system can significantly reduce these health-risking behaviours in adolescents community-wide

Author (year)	Hawkins (2012)
Objective	See objective for Hawkins (2008a,b) above
Study design	See study design for Hawkins (2008a,b) above
Participants	See participants for Hawkins (2008a,b) above: 4 407 fifth-grade students were surveyed annually until grade 10
Outcomes	Levels of risk, incidence and prevalence of tobacco, alcohol and other drug use, delinquency and violent behaviour by grade 10. Follow-up: 6 years post baseline
Results	**Incidence (intervention versus CTC) in grade 10; 95 % CI for all** Alcohol: AOR 0.62 (0.41 to 0.94); in favour of CTC Cigarettes: AOR 0.54 (0.36 to 0.80); in favour of CTC No significant differences were observed in the incidence of smokeless tobacco, marijuana, inhalant or prescription drug use **Prevalence (control versus CTC) in grade 8, last 30 days; 95 % CI for all** Alcohol: AOR 1.10 (0.82 to 1.47); no significant difference Cigarettes: AOR 0.79 (0.64 to 0.99); in favour of CTC Smokeless tobacco: AOR, 0.85 (0.63 to 1.15); no significant difference Inhalants: AOR 1.50 (0.88 to 2.58); no significant difference Marijuana: AOR 0.99 (0.66 to 1.49); no significant difference Prescription drugs: AOR 1.15 (0.81 to 1.65); no significant difference Other illicit drugs: AOR 1.25 (0.90 to 1.73); no significant difference Binge drinking in the last 2 weeks: AOR 0.89 (0.67 to 1.19); no significant difference Delinquent behaviours last year: AOR 0.89 (0.77 to 1.03); no significant difference Violent behaviours last year: AOR 0.84 (0.66 to 1.05); no significant difference
Conclusions of the authors	Using the CTC system can produce enduring reductions in community-wide levels of risk factors and problem behaviours among adolescents beyond the years of supported implementation, potentially contributing to long-term public health benefits

Author (year)	Hawkins (2014)
Objective	See objective for Hawkins (2008a,b) above
Study design	See study design for Hawkins (2008a,b) above
Participants	See participants for Hawkins (2008a,b) above: 4 407 fifth-grade students were surveyed until grade 12
Outcomes	Levels of targeted risk; sustained abstinence and cumulative incidence by grade 12 and current prevalence of tobacco, alcohol and other drug use; delinquency and violence in grade 12. Follow-up: 8 years post baseline
Results	**Incidence (CTC versus control) in grade 12; 95 % CI for all** Smokeless tobacco: absolute risk reduction (ARR) 0.97 (0.82 to 1.15); no significant difference Inhalants: ARR 0.93 (0.81 to 1.07); no significant difference Prescription drugs: ARR 1.98 (0.85 to 1.13); no significant difference Ecstasy (MDMA, 3,4-methylenedioxymethamphetamine): ARR 1.18 (0.86 to 1.63); no significant difference Cocaine: ARR 0.94 (0.73 to 1.21); no significant difference LSD: ARR 1.15 (0.90 to 1.46); no significant difference Stimulants: ARR 0.96 (0.68 to 1.36); no significant difference Other illicit drugs: ARR 1.07 (0.89 to 1.29); no significant difference Violence: ARR 0.86 (0.76 to 0.98); in favour of CTC **Prevalence (CTC versus control) in grade 12, last 30 days; 95 % CI for all** Any drugs: ARR 1.01 (0.83 to 1.21); no significant difference Gateway drugs: ARR 1.01 (0.84 to 1.21); no significant difference Alcohol: ARR 1.04 (0.85 to 1.28); no significant difference Cigarettes: ARR 0.94 (0.76 to 1.15); no significant difference Smokeless tobacco: ARR 0.83 (0.66 to 1.06); no significant difference Inhalants: ARR 1.37 (0.73 to 2.57); no significant difference Marijuana: ARR 1.09 (0.93 to 1.28); no significant difference Prescription drugs: ARR 1.44 (0.98 to 2.12); no significant difference LSD: ARR 1.41 (0.81 to 2.45); no significant difference Cocaine: ARR 1.52 (0.77 to 2.99); no significant difference Stimulants: ARR 0.84 (0.37 to 1.89); no significant difference Ecstasy (MDMA): ARR 1.89 (1.09 to 3.27); in favour of control Other illicit drugs: ARR 1.39 (0.90 to 2.15); no significant difference Binge drinking in the last 2 weeks: ARR 0.94 (0.72 to 1.23); no significant difference **In the past year** Gateway drugs: ARR, 0.97 (0.82 to 1.14); no significant difference Alcohol: ARR 0.99 (0.83 to 1.18); no significant difference Cigarettes: ARR, 0.97 (0.82 to 1.15); no significant difference Marijuana: ARR 0.99 (0.87 to 1.12); no significant difference Delinquency: ARR 1.02 (0.90 to 1.17); no significant difference Violence: ARR 0.97 (0.77 to 1.21) no significant difference
Conclusions of the authors	Using the CTC system continued to prevent the initiation of adolescent problem behaviours in grade 12, 8 years after implementation of CTC and 3 years after study-provided resources ended, but did not result in reductions in levels of risk or the prevalence of problem behaviour in grade 12

Author (year)	Kim (2014)
Objective	To examine the effect of CTC on overall levels of protection community-wide
Study design	See study design for Hawkins (2008a,b) above
Participants	See participants for Hawkins (2008a,b) above: 4 407 young people in CTC and control communities followed from grade 5 to grade 8
Outcomes	Adjusted difference in mean levels of eight grade-12 protective factors divided into four domains: peer/individual, family, school and community. Protective factors measured included opportunities and recognition for pro-social involvement in each domain, social skills, attachment to the family and the community, commitment to school and healthy benefits
Results	Mean levels of protective factors at baseline in grade 5 were not significantly different between control and CTC communities, with the exception of the level of community attachment, which was higher among CTC young people. Calculating the global test statistic (GTS) to assess the overall effect of CTC across all protective factors, the test indicated that the overall level of protection was significantly higher in CTC communities than in control communities at the end of grade 8 (GTS $t = 2.481$, $p = 0.021$). This overall effect appears to be a result of increases in protection in all but one of the protective domains. With the exception of family domain (GTS $t = 1.279$, $p = 0.214$), levels of domain-specific protection were significantly higher in CTC than in control communities in the following domains: community (GTS $t = 2.328$, $p = 0.029$), school (GTS $t = 2.234$, $p = 0.018$) and peer/individual (GTS $t = 2.329$, $p = 0.029$). Four specific protective factors were significantly higher in CTC than in control communities for pro-social involvement: community opportunities ($p = 0.004$); school recognition ($p = 0.025$); interaction with pro-social peers ($p = 0.050$) and social skills ($p = 0.025$)
Conclusions of the authors	Analyses by domain found significantly higher levels of protection in CTC than in control communities in the community, school and peer/individual domains, but not in the family domain. This is consistent with CTC's theory of change, which posits that strengthening protective factors is a mechanism through which CTC prevents behaviour problems
Author (year)	**Kuklinski (2012)**
Objective	To estimate long-term monetary benefits associated with significant intervention effects on cigarette smoking and delinquency compared with the cost of conducting the interventions of CTC; outcomes at grade 8
Study design	Cost-benefit analysis
Participants	See participants for Hawkins (2008a,b) above: 4 407 students followed from grade 5 to grade 8 in an RCT involving 24 communities in seven states
Outcomes	(1) What is the cost of implementing CTC, for the community and on a per-young person basis; (2) what benefits can be expected to accrue to society over the long term, based on findings at grade 8 that CTC significantly prevents cigarette smoking and delinquency initiation in young people; and (3) is the CTC intervention, which spreads costs throughout an entire community, cost-beneficial?
Results	Eighth graders in control communities were significantly more likely to initiate tobacco use and delinquency than eighth graders in CTC communities (tobacco use: 9.4 % CTC versus 15.1 % control; delinquency: 3.7 % CTC versus 4.7 % control). Smoking-related benefits totalled USD 812 per young person, including USD 181 from reductions in mortality and USD 631 from improvements in health. Of these benefits, USD 671 accrued to participants over their lifetimes, and taxpayers accrued another USD 141 per participant. The delinquency-related benefit from CTC implementation was USD 4 438 per young person: USD 2 033 from reductions in criminal justice system costs, which accrued to taxpayers, and USD 2 405 from reductions in victim costs, which accrued to the general public. The combined CTC benefit based on the prevention of smoking and delinquency initiation was USD 5 250 per young person, with USD 671 (13 %) to participants, USD 2 173 (41 %) to taxpayers and USD 2 405 (48 %) to the general public
Conclusions of the authors	Results indicate that CTC is a cost-beneficial way to prevent adolescent tobacco use and delinquency initiation, even with a very conservative cost estimate of USD 991 per young person over 5 years. Communities willing to invest in CTC can expect to generate long-term benefits of at least USD 5 250 per young person (in 2004 discounted value)
Author (year)	**Kuklinski (2015)**
Objective	To estimate long-term monetary benefits associated with significant intervention effects on cigarette smoking and delinquency compared with the cost of conducting the interventions of CTC; outcomes at grade 10
Study design	Cost-benefit analysis
Participants	See participants for Hawkins (2008a,b) above: 4 407 students followed from grade 5 to grade 10 in an RCT involving 24 communities in seven states
Outcomes	CTC implementation costs and sustained abstinence from delinquency, alcohol use and cigarette smoking
Results	Economic benefits per young person from CTC's effect on delinquency were USD 897 in avoided criminal justice costs, USD 1 729 in victimisation savings and USD 1 850 in indirect earnings and healthcare benefits from increased rates of high school graduation. Projected benefits from reducing alcohol initiation in young people were USD 287. Benefits from preventing cigarette smoking in young people were USD 45. These benefits result from CTC's indirect effects on alcohol use disorders and heavy regular smoking, which are estimated to be lower in young people exposed to CTC because of their significantly higher rates of abstinence from these forms of substance use through high school. Total benefits were USD 4 477, equivalent to delinquency benefits as presented above because these represented the largest benefit from each source. CTC's weighted average implementation cost was USD 556 per young person for 5 years of intervention or USD 112 annually
Conclusions of the authors	This study's findings indicate that CTC is a cost-beneficial approach to preventing the initiation of delinquency, alcohol use and tobacco use in children and adolescents community-wide to grade 12

Author (year)	Oesterle (2010)		
Objective	To examine whether or not the effect of CTC on the prevalence of drug use and a range of delinquent acts varied by baseline risk and gender		
Study design	See study design for Hawkins (2008a,b) above		
Participants	See participants for Hawkins (2008a,b) above: 4 407 eighth-grade students		
Outcomes	Measures of baseline risk, substance use and delinquency; outcomes for the past 30 days and past year		
Results		**Observed eighth-grade substance use and delinquency by intervention condition and targeted risk at baseline; CTC versus control; AOR for all; 95 % CI**	
		Not high risk	**High risk**
	Past 30 days use		
	Alcohol	0.79 (0.63 to 1.00); no significant difference	0.92 (0.57 to 1.49); no significant difference
	Marijuana	1.04 (0.64 to 1.69); no significant difference	0.73 (0.39 to 1.38); no significant difference
	Past 30 days use		
	Binge drinking	0.75 (0.50 to 1.10); no significant difference	0.82 (0.44 to 1.50); no significant difference
	Past 2 weeks use		
	Cigarettes	0.98 (0.67 to 1.44); no significant difference	0.61 (0.33 to 1.12); no significant difference
	Smokeless tobacco	0.49 (0.28 to 0.87); in favour of CTC	0.68 (0.30 to 1.55); no significant difference
	Delinquency past year		
	Mean of delinquent acts	0.70 (0.60 to 0.81) in favour of CTC	0.83 (0.62 to 1.12); no significant difference
		Observed eighth-grade substance use and delinquency by intervention condition and gender; CTC versus control; AOR for all; 95 % CI	
		Girls	**Boys**
	Past 30 days use		
	Alcohol	0.91 (0.70 to 1.19); no significant difference	0.69 (0.48 to 0.98); in favour of CTC
	Marijuana	1.22 (0.69 to 2.13); no significant difference	0.66 (0.40 to 1.09); no significant difference
	Past 2 weeks use		
	Binge drinking	0.88 (0.58 to 1.36); no significant difference	0.62 (0.40 to 0.95); in favour of CTC
	Past 30 days use		
	Cigarettes	0.92 (0.61 to 1.39); no significant difference	0.71 (0.45 to 1.11); no significant difference
	Smokeless tobacco	0.90 (0.42 to 1.93); in favour of CTC	0.44 (0.25 to 0.77); in favour of CTC
	Delinquency past year		
	Mean of delinquent acts	0.76 (0.58 to 0.99); in favour of CTC	0.71 (0.57 to 0.87); in favour of CTC
Conclusions of the authors	The effect of CTC on reducing substance use in grade 8 was stronger for boys than for girls and the impact of CTC on reducing delinquency in grade 8 was stronger for students who were non-delinquent at baseline		

Author (year)	Oesterle (2015)
Objective	To examine whether or not the effects of the CTC prevention programme on the prevalence of substance use and a range of delinquent behaviours held equally for boys and girls, defined by early substance use, early delinquency and high levels of community-targeted risk at baseline
Study design	See study design for Hawkins (2008a,b) above
Participants	See participants for Hawkins (2008a,b) above: 4 407 12th-grade students
Outcomes	Prevalence of lifetime and current substance use, and delinquency
Results	Results from subgroup analysis by gender indicated that boys in CTC communities compared with boys in control communities were significantly more likely to have abstained from any delinquent behaviour (ARR 1.33; $p = 0.021$) and from ever using cigarettes (ARR 1.22; $p = 0.013$). There were no statistically significant sustained effects of CTC on abstinence and incidence of substance use or delinquency among girls at age 19. CTC did not have a statistically significant effect in the desired direction on other specific primary or secondary outcomes for boys or girls. Subgroup analysis by gender revealed, however, three significant effects in favour of the control communities: prevalence of ecstasy use in the past month and past year for girls and receiving money or drugs in exchange for sex in the past year for boys
Conclusions of the authors	Communities using CTC may need to extend their prevention planning to include the high school years to sustain effects on drug use and delinquency beyond high school for both genders
Author (year)	**Shakeshaft (2014)**
Objective	To conduct the first non-US RCT of community action to quantify the effectiveness of this approach in reducing risky alcohol consumption and harms measured using both self-report and routinely collected data
Study design	RCT
Participants	Twenty communities in Australia that had populations of 5 000-20 000, were at least 100 km from an urban centre (population up to maximum 100 000) and were not involved in another community alcohol project. Routinely collected data for the entire study period (2001-2009) were obtained in 2010
Outcomes	Primary outcomes: alcohol-related crime, traffic crashes, and hospital inpatient admissions. Secondary outcomes based on pre- and post-intervention surveys (n = 2 977 and 2 255, respectively): long-term risky drinking, short-term high-risk drinking, short-term risky drinking, weekly consumption, hazardous/harmful alcohol use, and experience of alcohol harm
Results	**Alcohol-related crime, traffic crashes and hospital inpatient admissions; 95 % CI for all** Total alcohol-related crime: ARR 0.83 (0.66 to 1.05); no significant difference Alcohol-related assaults: ARR 0.86 (0.66 to 1.13); no significant difference Alcohol-related malicious damage: ARR 0.91 (0.73 to 1.13); no significant difference Alcohol-related street offences: ARR 0.67 (0.44 to 1.02); no significant difference Total number of alcohol-related crashes: ARR 1.00 (0.74 to 1.36); no significant difference Number of persons injured: ARR 0.96 (0.57 to 1.61); no significant difference Number of crashes with no injury/fatality: ARR 0.93 (0.71 to 1.22); no significant difference Inpatient admissions for alcohol dependence: ARR 1.00 (0.48 to 2.08); no significant difference Inpatient admissions for alcohol abuse: ARR 1.58 (0.98 to 2.53); no significant difference **Alcohol self-reported consumption and harms; 95 % CI for all** Long-term risky drinking: AOR 0.69 (0.46 to 1.04); no significant difference Short-term risky drinking (past 12 months): AOR 0.96 (0.65 to 1.42); no significant difference Short-term high-risk drinking (past 12 months): AOR 0.69 (0.45 to 1.07); no significant difference Hazardous/harmful drinking (AUDIT score ≥ 8): AOR 0.80 (0.55 to 1.18); no significant difference Experience of alcohol-related verbal abuse: AOR 0.58 (0.35 to 0.96); in favour of the intervention Average consumption (standard drinks per week): adjusted mean difference (AMD) −1.90 (−3.37 to −0.43); in favour of the intervention
Conclusions of the authors	This RCT provides little evidence that community action significantly reduces risky alcohol consumption and alcohol-related harms, other than potential reductions in self-reported average weekly consumption and experience of alcohol-related verbal abuse. Complementary legislative action may be required to reduce alcohol harms more effectively

Author (year)	Shapiro (2013)
Objective	To determine whether or not the effect of CTC on community-wide adoption of a science-based approach to prevention varies significantly between communities 1.5 years into the CTC implementation process
Study design	See study design for Hawkins (2008a,b) above
Participants	See participants for Hawkins (2008a,b) above
Outcomes	The Community Key Informant Survey was used to collect data from community leaders in all 24 communities in 2001 (about 1.5 years before CTC implementation) and in 2004 (about 1.5 years after CTC implementation had begun). The survey was conducted using computer-assisted telephone interviews that typically lasted an hour. This survey is not CTC specific but uses generic language to assess the extent to which leaders report that their communities are using a science-based approach to prevention (e.g. 'Did your community prioritise risk and protective factors that you wanted to address with prevention activities?')
Results	At 1.5 years after the implementation of CTC began, community adoption scores were assessed using a 0-5 scale, with higher scores indicating a greater extent of community adoption of science-based prevention measures For intervention communities, community adoption scores ranged from 1.87 to 3.73 (mean 2.80; SD 0.55), indicating that leaders typically reported that their communities were collecting epidemiological data on risk and protective factors, but were not consistently using tested and effective preventative interventions. In the control communities, community adoption scores ranged from 0.62 to 3.29 (mean 1.69; SD 0.79), indicating that leaders were typically aware of prevention science concepts, but, on average, were not yet using science-based concepts to guide prevention efforts. In six of the 12 (50 %) community pairs, the CTC community had significantly higher levels of adoption than its matched community. In another five (33 %) community pairs, the CTC community had higher levels of adoption than its matched community, but the difference was not statistically significant
Conclusions of the authors	Using information collected from CTC coalition members in the CYDS to explore sources of the variance in the effect of CTC on the adoption of a science based approach to prevention is an important next step to advance understanding of how coalitions can facilitate community adoption of science-based prevention approaches
Author (year)	**Van Horn (2014)**
Objective	To investigate the degree to which the CTC system affects the probability that adolescents engage in specific behavioural profiles of substance use, delinquency and violence in grades 8 and 10
Study design	Cross-sectional survey
Participants	See participants for Hawkins (2008a,b) above; data were collected from students in grades 6, 8, 10 and 12. Intervention effects were examined for 14 099 students in grades 8 and 10 using anonymous cross-sectional surveys in 2004 and 2010 and analysed in 2012
Outcomes	Different profiles of self-reported substance use and delinquency in grade 8 and grade 10
Results	In the cross-sectional 2010 data, there was no intervention effect on the probability of experimenting with substances or of substance use coupled with delinquent activities for either grade. However, 10th-graders in intervention communities were significantly less likely to be alcohol users than those in control communities (OR 0.69, (95 % CI 0.48 to 1.00)), although the result is not statistically significant
Conclusions of the authors	Only one of three hypothesised intervention effects was found: a 7 percentage point reduction in alcohol users in grade 10. Contrary to our hypothesis, no differences in experimenters were found across intervention conditions for either eighth or 10th grade students in the cross-sectional 2010 survey. Analyses showed no evidence of intervention effects on more serious levels of problem behaviours, although these analyses were exploratory and effects were not specifically hypothesised

Annex 2

Search strategies

CDAG Specialised Register (through CRS)
8 September 2015 (6 hits)
'Communities That Care'

CENTRAL, DARE (through The Cochrane Library)
Issue 9, September 2015 (CENTRAL 112 hits; DARE 1 hit)

#1 MeSH descriptor: [Substance-Related Disorders] explode all trees
#2 ((stimulant* or polydrug* or drug* or substance or alcohol) near/3 (abuse* or abusing or consumption or addict* or disorder* or intoxicat* or misus* or use*)):ti,ab
#3 (abuse* or abusing or consumption or addict* or disorder* or intoxicat* or misus* or use*):ti,ab
#4 MeSH descriptor: [Narcotics] explode all trees
#5 heroin:ti,ab
#6 MeSH descriptor: [Street Drugs] explode all trees
#7 MeSH descriptor: [Amphetamine] explode all trees
#8 (amphetamine* or dextroamphetamine* or methamphetamine or Methylamphetamine*):ti,ab,kw (Word variations have been searched)
#9 (ecstasy or MDMA or hallucinogen*):ti,ab,kw (Word variations have been searched)
#10 MeSH descriptor: [Cocaine] explode all trees
#11 (crack or cocaine):ti,ab,kw (Word variations have been searched)
#12 MeSH descriptor: [Cannabis] explode all trees
#13 (cannabis or marijuana or marihuana or Hashish):ti,ab,kw (Word variations have been searched)
#14 (Lysergic next Acid):ti,ab,kw
#15 LSD: ti,ab,kw (Word variations have been searched)
#16 (benzodiazepine* or barbiturate* or ketamine or solvent or inhalant):ti,ab,kw (Word variations have been searched)
#17 #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16
#18 #3 and #17
#19 #1 or #2 or #18
#20 adolescen*:ti,ab,kw or teenage*:ti,ab,kw or young:ti,ab,kw or student*:ti,ab,kw or juvenile:ti,ab,kw or child*:ti,ab,kw or school*:ti,ab,kw or class*:ti,ab,kw
#21 #19 and #20
#22 (communit* near/3 (engagement or initiative* or intervention* or scheme* or participat* or project* or program* or activit* or partnership* or action or strategy*)):ti,ab
#23 (prevent* or reduc*):ti,ab
#24 communities next that next care
#25 #22 and #23
#26 #24 or #25
#27 #21 and #26

MEDLINE (through PubMed)
8 September 2015 (624 hits)

((((Substance-Related Disorders[MeSH] OR substance use*[tiab] OR drug use*[tiab] OR ((abuse*[tiab] OR depend*[tiab] OR addict*[tiab]) AND (drug*[tiab] OR substance[tiab] OR Cannabis[MeSH] OR N-Methyl-3,4-methylenedioxyamphetamine[MeSH] OR ecstasy[tiab] OR MDMA[tiab] OR "Hallucinogens"[MeSH] OR hallucinogen*[tiab] OR cocaine[tiab] OR cocaine[MeSH] OR "Lysergic Acid Diethylamide"[MeSH] OR LSD[tiab] OR heroin[tiab] OR morphine[tiab] OR Heroin[MeSH]))) OR (alcohol*[tiab] AND (drink*[tiab] OR beverage*[tiab] OR intoxicat*[tiab] OR abus*[tiab] OR misus*[tiab] OR risk*[tiab] OR consum*[tiab] OR excess*[tiab] OR problem*[tiab])) OR (drink*[tiab] AND (excess*[tiab] OR heavy[tiab] OR heavily[tiab] OR hazard*[tiab] OR binge[tiab] OR harmful[tiab] OR problem*[tiab])) OR ("Alcohol Drinking"[MeSH])) AND ((adolescen*[tiab] OR teenage*[tiab] OR young[tiab] OR student*[tiab] OR juvenile[tiab] OR kid[tiab] OR kids[tiab] OR youth[tiab] OR underage[tiab]) OR (Adolescent[MeSH])) AND (("Communities That Care") OR ((((Community engagement[tiab] OR community initiative*[tiab] OR Community-based[tiab] OR communit* AND participat*[tiab] OR Community Action[tiab] OR Community coalition[tiab] OR (Comunit*[tiab] AND prevention strategy*[tiab]))))) AND (Prevent*[tiab] OR reduc*[tiab])))) OR Communities That Care[tiab]

EMBASE (through embase.com)
8 September 2015 (600 hits)

(communit* NEAR/3 (initiative* OR engagement OR intervention* OR scheme* OR participat* OR project* OR program* OR activit* OR partnership* OR action OR strategy*)):ab,ti AND (prevent*:ab,ti OR reduc*:ab,ti) OR 'Communities That Care' AND ('adolescent'/exp OR 'child'/exp OR adolescen*:ab,ti OR teenage*:ab,ti OR young:ab,ti OR student*:ab,ti OR juvenile:ab,ti OR child*:ab,ti OR school*:ab,ti) AND ('illicit drug'/exp OR 'drug abuse'/exp OR 'substance abuse'/exp OR (substance:ab,ti AND (addict*:ab,ti OR abus*:ab,ti OR use*:ab,ti)) OR (drug*:ab,ti AND (addict*:ab,ti OR abus*:ab,ti)) OR (drug NEAR/3 use*):ab,ti OR (addict*:ab,ti OR abuse*:ab,ti OR (use*:ab,ti AND (disorder*:ab,ti OR illicit:ab,ti)) AND ('morphine'/exp OR morphine:ab,ti OR 'diamorphine'/exp OR heroin:ab,ti OR 'cannabis'/exp OR cannabis:ab,ti OR marijuana:ab,ti OR marihuana:ab,ti OR hashish:ab,ti OR 'psychedelic agent'/exp OR ecstasy:ab,ti OR mdma:ab,ti OR hallucinogen*:ab,ti OR lsd:ab,ti OR 'cocaine'/exp OR cocaine:ab,ti)) OR (drink* NEAR/3 (excess* OR heavy OR heavily OR hazard* OR binge OR harmful OR problem*)):ab,ti OR (alcohol* NEAR/3 (drink* OR beverage* OR intoxicat* OR abus* OR misus* OR risk* OR consum* OR excess* OR problem*)):ab,ti OR 'alcohol abuse'/exp)

Annex 3

Characteristics of excluded studies

First author	Year	Reason for exclusion
Arthur	2010	To evaluate the extent to which the CYDS coalitions in the intervention communities implemented the CTC system to a significantly greater extent than prevention coalitions in control communities
Briney	2012	To assess the validity of risk and protective factor cut-point values in predicting substance use and delinquent behaviour
Brown	2007	Assessment of collaboration and fidelity in adoption
Brown	2009	Design and analysis of the CYDS longitudinal cohort sample
Brown	2010	The study examines how aspects of coalition functioning predict a coalition's ability to promote high-quality implementation of evidence-based programmes
Brown	2011	To examine differences between CTC and control communities 4.5 years after CTC implementation
Brown	2014	The study examined whether or not the significant intervention effects of the CTC prevention system on previously observed problem behaviours in young people (Hawkins et al., 2009) were mediated by community-level prevention system constructs posited in the CTC theory of change
Brown	2015	To explore the characteristics of coalitions that enable the provision of implementation support for prevention programmes in general and for the implementation of evidence-based prevention programmes with fidelity
Fagan	2009	The aim of the study was to evaluate the extent to which the five phases of CTC were fully implemented in the 12 intervention communities
Fagan	2011	To evaluate the effects of CTC on the adoption and implementation fidelity of evidence-based prevention programmes in communities
Fagan	2012	To test if increasing the implementation fidelity, dissemination and sustainability of tested and effective prevention programmes is effective in achieving major goals of prevention science
Gloppen	2012	To examine the sustainability of CTC coalitions approximately 20 months after study support for the intervention ended
Harachi	1996	To conduct quantitative assessments of community risk factors and protective resources, and to develop comprehensive prevention plans incorporating promising approaches to priority risk
Hemphill	2006	To evaluate the effect of school suspensions and arrests on subsequent adolescent antisocial behaviour
Jones	2011	Systematic review and did not report data on CTC separately
Jonkman	2009	Narrative review of two included studies (CYDS trial (Hawkins et al., 2002, 2014) and Steketee et al., 2013).
Kuklinski	2013	The study examined implications of the economic downturn that began in December 2007 for the CYDS RCT
Monahan	2013	An illustration of the advantages of meta-analyses within the context of matched-pair RCTs
Morojele	2002	To examine, for South African adolescents: (1) the reliability of subscales of the CTC survey of risk and protective factors for drug use and antisocial behaviour; and (2) the extent to which tobacco, alcohol and marijuana use can be predicted from community, family, school and peer-individual factors based on subscales of the CTC Youth Survey
Murray	2006	To use data from an earlier study, which included the CYDS communities, to compare pre-post mixed-model ANCOVA models against random coefficients models, in both one- and two-stage versions
Oesterle	2014	To test variation in the effects of CTC in people with high levels of community-targeted risk factors at baseline compared with those without. Same sample as for Hawkins et al. (2008a,b)
Quinby	2008	The article describes the degree to which high fidelity implementation of the CTC prevention system was reached during the first 18 months of intervention described in Hawkins et al. (2008a,b)
Scholes-Balog	2013	The study explores the social, contextual and individual factors that predict early initiation of alcohol use
Shapiro	2013	The study compares the observations of multiple types of informant to measure dimensions of coalition functioning for effective and participatory community practice
Shapiro	2015	The study measures several coalition capacities that are hypothesised to facilitate the adoption of evidence-based prevention programmes
Steketee	2013	To describe the results of a binational comparative work to understand similarities and differences in the implementation of CTC in two experimental studies of CTC, one in the Netherlands and one in the US
Wongtongkam	2014	The study investigates risk and protective factors for substance abuse in a sample of 1 778 students attending technical colleges in the Bangkok and Nakhon Ratchasima provinces of Thailand using a self-report questionnaire modified from the CTC Youth Survey

TD-AU-17-001-EN-N

Acknowledgements

The report was written by Laura Amato, Zuzana Mitrova and Marina Davoli (Cochrane Drugs and Alcohol Group) and revised by Nick Axford (Dartington Social Research Unit), Charlotte De Kock (Ghent University, Institute for International Research on Criminal Policy) and Fabrizio Faggiano (Avogadro University, Italy).

EMCDDA project team: Marica Ferri, Gregor Burkhart, Alessandra Bo and Claúdia Costa Storti.

About the EMCDDA

The European Monitoring Centre for Drugs and Drug Addiction is the hub of drug-related information in Europe. Its mission is to provide the European Union and its Member States with 'factual, objective, reliable and comparable information' on drugs and drug addiction and their consequences. Established in 1993, it opened its doors in Lisbon in 1995, and is one of the European Union's decentralised agencies. The Centre offers policymakers the evidence base they need for drawing up drug laws and strategies. It also helps professionals and researchers pinpoint best practice and new areas for analysis.

Related publications

- EMCDDA (2013), *North American drug prevention programmes: are they feasible in European cultures and contexts?*, EMCDDA Papers
- EMCDDA (2015), *Prevention of addictive* behaviours, EMCDDA Insights 28
- EMCDDA (2013), *European drug prevention quality standards: a quick guide*

These and all other EMCDDA publications are available from www.emcdda.europa.eu/publications

Legal notice: The contents of this publication do not necessarily reflect the official opinions of the EMCDDA's partners, the EU Member States or any institution or agency of the European Union. More information on the European Union is available on the internet (www.europa.eu).

Luxembourg: Publications Office of the European Union
PRINT doi: 10.2810/68897 | ISBN 978-92-9497-048-0
PDF doi: 10.2810/972747 | ISBN 978-92-9497-049-7

© European Monitoring Centre for Drugs and Drug Addiction, 2017
Reproduction is authorised provided the source is acknowledged.

This publication is only available in electronic format.

EMCDDA, Praça Europa 1, Cais do Sodré, 1249-289 Lisbon, Portugal
Tel. (351) 211 21 02 00 | info@emcdda.europa.eu
emcdda.europa.eu | twitter.com/emcdda | facebook.com/emcdda

Publications Office