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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

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Abstract

Objective—To determine whether the Communities That Care (CTC) prevention system is a cost-beneficial intervention.

Methods—Data were from a longitudinal panel of 4,407 youth participating in a randomized controlled trial including 24 towns in 7 states, matched in pairs within state and randomly assigned to condition. Significant differences favoring intervention youth in sustained abstinence from delinquency, alcohol use, and tobacco use through Grade 12 were monetized and compared to economic investment in CTC.

Results—CTC was estimated to produce $4,477 in benefits per youth (discounted 2011 dollars). It cost $556 per youth to implement CTC for 5 years. The net present benefit was $3,920. The benefit-cost ratio was $8.22 per dollar invested. The internal rate of return was 21%. Risk that investment would exceed benefits was minimal. Investment was expected to be recouped within 9 years. Sensitivity analyses in which effects were halved yielded positive cost-beneficial results.

Conclusions—CTC is a cost-beneficial, community-based approach to preventing initiation of delinquency, alcohol use, and tobacco use. CTC is estimated to generate economic benefits that exceed implementation costs when disseminated with fidelity in communities.

Keywords

Benefit-Cost Analysis; Communities That Care; Delinquency Prevention; Substance Use Prevention; Youth Development

Introduction

There is growing support for “evidence-based” approaches to preventing and reducing crime and delinquency (Cullen et al. 2011; Elliott 2012; Sherman et al. 1998; Welsh and Farrington 2012a), and an increasing number of evidence-based interventions have been tested and shown to be effective in reducing illegal behavior (O'Connell et al. 2009; U.S.

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Department of Health and Human Services 2001; Welsh and Farrington 2012b). Yet there is also a significant gap between the number of available evidence-based programs and the number of communities implementing such interventions (Gottfredson and Gottfredson 2002; Spoth et al. 2013), signifying the need to develop and test strategies that can increase the delivery of effective preventive interventions. In particular, few models have been identified which can build support for and increase community infrastructure to choose and implement evidence-based programs for reducing delinquency and substance use among youth in the community (David-Ferdon and Hammond 2008; O'Connell et al. 2009; Welsh et al. 2010).

This paper presents findings from a benefit-cost analysis of the Communities That Care prevention system, which is specifically designed to build capacity of communities to appropriately select and effectively implement evidence-based preventive interventions (Hawkins et al. 2002). This is one of the first reports to document the economic costs and benefits of a community–based prevention strategy, despite calls for more cost-benefit information in the prevention literature (O'Connell et al. 2009; Spoth et al. 2013; Welsh and Farrington 2012a) and a gradual accumulation of literature indicating the economic gains of other types of prevention strategies (Heckman et al. 2010; Lee et al. 2012a; Reynolds et al. 2011).

Limited information regarding both the effectiveness of community-based prevention efforts and their financial costs and benefits is likely due to the significant challenges of creating and testing these types of interventions (Catalano et al. 1998; Fagan and Hawkins 2012; Sampson 2011; Welsh and Farrington 2000). Community-based models typically rely on local coalitions to coordinate the implementation of multiple prevention strategies across agencies, and it can be very difficult to engage and ensure collaboration among diverse stakeholders who may have different skills, needs, resources, and ideas about what is needed to prevent crime (Merzel and D'Afflitti 2003; Rosenbaum and Schuck 2012; Stith et al. 2006). In addition, ensuring the adoption and high-quality implementation of a single prevention strategy is difficult, and problems are likely to be multiplied when implementing several programs across a variety of settings (Wandersman and Florin 2003). Furthermore, enacting multiple programs and delivering them at a scale large enough and long enough to produce community-wide changes is likely to require significant human and financial resources, as well as long-term investments (Fagan and Hawkins 2012). Although the potential pooling of resources across agencies and economies of scale can result in cost savings, securing funds can be challenging, particularly if benefits may not be seen for many years or if they will be realized in systems different from those actually paying implementation costs (Greenwood and Welsh 2012).

The potential for community-based approaches to crime prevention to produce substantial and widespread reductions in illegal behaviors, as well as their ability to ensure that services are a good fit with local needs, resources, and norms, has led to calls for greater use of these strategies (David-Ferdon and Hammond 2008; O'Connell et al. 2009; Rosenbaum and Schuck 2012; Spoth et al. 2013). Yet support may be ill-placed if community-based approaches cannot produce the desired change, or if implementation is not cost beneficial. This paper seeks to address these issues by describing the methodology for and results of a

benefit-cost analysis of the Communities That Care (CTC) prevention system, as evaluated in a randomized trial involving 24 communities (Hawkins et al. 2008b). We monetize significant intervention effects of CTC on sustained abstinence from delinquency and substance use observed from Grades 5 to 12 in a longitudinal panel of students and compare the results to the cost of implementation to determine whether CTC is a good economic investment.

The Communities That Care Prevention System

Communities That Care (CTC) is a community mobilization strategy intended to produce community-wide reductions in youth substance use, delinquency, violence, and other problem behaviors. It does so by transforming the local environment in ways that (a) improve collaboration and coordinated action among broad-based coalitions of community stakeholders; (b) strengthen community norms to be less tolerant of adolescent delinquency; and (c) increase the adoption, effective implementation, and widespread delivery of evidence-based prevention policies, programs, and practices (Hawkins et al. 2002). To achieve the third goal, CTC assists community members in understanding the factors that influence the development of youth problems (including offending over the life course), namely, risk factors that increase the likelihood of problem behavior and protective factors which reduce this likelihood (Farrington 2000; Hawkins et al. 1992). Community members use epidemiological surveys of local 6th-, 8th-, 10th-, and 12th-grade students to collect information about youth exposure to risk and protective factors and are trained to select and implement with quality evidence-based programs that address the most elevated risk factors and most depressed protective factors in their own community.

As indicated by its emphasis on using community-driven actions to prevent and reduce youth problems including antisocial behavior, CTC seeks to operationalize tenets of both ecological and developmental theories of criminology. First, CTC is aligned with the view of social disorganization theories (Sampson et al. 1997; Shaw and McKay 1942) that structural (i.e., economic) and social characteristics of communities affect juvenile delinquency. Given the difficulties in changing local economies and structural conditions (Sampson 2011), CTC focuses on altering social processes that may influence youth delinquency. In particular, it seeks to build the collective efficacy (Sampson et al. 1997) of community residents, which has been shown to reduce adolescent delinquency (Elliott et al. 1996; Jain et al. 2010; Molnar et al. 2004; Simons et al. 2005).

CTC provides a structured process and methodology for enhancing collective efficacy, or the ability of local residents to reach consensus and take informal actions to reduce crime (Sampson et al. 1997). A necessary first step for doing so in the CTC system is the formation or identification of a broad-based community coalition, whose members must reach agreement that the prevention of youth problem behaviors is important and recognize that achieving this outcome will require the full and active participation of the community (Fagan and Hawkins 2013). The group then collectively determines the specific goals to be achieved in their community, based upon their collection and analysis of epidemiologic data from local youth who report in anonymous surveys their exposure to risk and protective factors in the community. It is important that this objective information, rather than the

subjective views of individuals or political interests, guide group decision making. Finally, coalition members reach agreement on the particular preventive interventions that will be enacted to address the specific needs (i.e., elevated risk factors and depressed protective factors), circumstances, and resources of each community. This collective process creates change from within the community, rather than having an outside "expert" diagnose problems and suggest solutions. This should build collective efficacy and increase local capacity to engage in effective prevention activities (Butterfoss et al. 1993; David-Ferdon and Hammond 2008).

In addition to emphasizing community participation, CTC stresses the importance of enacting developmental prevention programs that have been tested in rigorous scientific evaluation and shown to reduce risk factors, increase protective factors, and lower rates of delinquency or substance use. In doing so, CTC is guided by the social development model (SDM), an integrated developmental theory which recognizes that multiple risk and protective factors contribute to the etiology of both prosocial and antisocial behaviors over the lifespan (Catalano and Hawkins 1996). To achieve positive outcomes, young people need to be immersed in family, school, community, and peer environments that foster protection, particularly the communication of healthy beliefs and clear standards for behavior and the development of strong bonds to caring individuals. These factors will help counteract youth exposure to risk factors, inhibit the development of antisocial behavior, and increase the likelihood that youth will subscribe to the prosocial beliefs and standards of those with whom they are bonded (Catalano and Hawkins 1996). CTC operationalizes these approaches by advocating that communities prevent antisocial behaviors by reducing risk factors and enhancing protective factors (Fagan and Hawkins 2013).

While recognizing the importance of law enforcement strategies and correctional services in preventing crime and recidivism, CTC advocates that coalitions build their community's capacity to deliver *prevention services* to youth and/or their families. That is, coalitions are to direct resources to efforts which will prevent the onset of antisocial behavior among youth who have not yet engaged in delinquency, or which will reduce the escalation of delinquency among youth already involved in problem behaviors, albeit at low levels. For example, school-based curricula or parent training programs might be implemented to prevent substance use, delinquency, or violence among the general population. Selective or indicated interventions, such as tutoring services, mentoring programs, or family-focused programs, may also target youth identified as particularly vulnerable to deviance based on their current exposure to risk factors (e.g., academic failure or single-parent status) or current delinquent behavior.

To summarize, the CTC system provides coalitions with a structure and process that should facilitate collective efficacy, as well as information and skills necessary to collect local data on risk and protective factors and to target these factors with effective preventive interventions. In these ways, CTC seeks to improve the efficacy of community-based and community mobilization strategies, many of which have proven difficult to implement and limited in their effectiveness (Fagan and Lindsay 2014; Rosenbaum and Schuck 2012). For example, the Chicago Area Project (CAP) of the early 1930s involved the formation of broad-based groups of "natural leaders" (e.g., parents, youth, and adult representatives from

social service organizations) in three high-risk Chicago neighborhoods (Bursik and Grasmick 1993). Based on a community empowerment model emphasizing that local residents know what is best for their neighborhoods, coalitions were charged with taking ownership of neighborhood delinquency problems and implementing solutions to them. This initiative was not effective, however, suggesting that asking well-intentioned community residents to “do their best” cannot by itself reduce youth delinquency and substance use (Bursik and Grasmick 1993; Fagan and Hawkins 2012; Hallfors et al. 2002).

An evaluation of the One Vision, One Life intervention also points to the difficulties of successfully enacting community-based crime prevention (Wilson and Chermak 2011). In this project, community leaders were trained to gather information on local factors associated with violent crime, coordinate efforts to provide social services to at-risk youth and, with the assistance of neighborhood residents, defuse gang disputes that might otherwise lead to violent altercations (Wilson et al. 2010). A quasi-experimental evaluation relying on official crime data indicated no reduction in violent crime after 2 - 3 years of implementation (Wilson and Chermak 2011). The evaluators speculated that the null effects were due to poor implementation of the model, particularly the lack of oversight and support provided to local implementers. Other community-based initiatives have documented implementation challenges that threatened project success, indicating that communities require a high degree of proactive monitoring and assistance when planning, implementing, and evaluating prevention strategies (Hallfors et al. 2002; Komro et al. 2008; Merzel and D'Afflitti 2003; Rosenbaum and Schuck 2012).

CTC is designed to provide such assistance and build local capacity for effective prevention. The system also recognizes that most community members do not know which factors are most likely to influence youth crime, nor will they be aware of strategies that have been developed, tested in scientific studies, and demonstrated as effective in changing these factors. As a result, local agencies typically implement strategies that are easy or popular (e.g., afterschool recreational activities, Drug Abuse and Resistance Education, (D.A.R.E.), or the Scared Straight program), but which may not be effective (Rosenbaum and Schuck 2012). The CTC process is designed to help coalitions become aware of effective delinquency preventive interventions which alter the predictors of antisocial behavior (e.g., risk and protective factors), and promote the use of such interventions across community agencies. CTC currently directs coalitions to select evidence-based programs from the list on the Blueprints for Healthy Youth Development website (www.blueprintsprograms.com) given the rigorous standards for including programs on this list. At the time the randomized trial described here was conducted, CTC coalitions were instructed to select prevention programs listed in the *Communities That Care Prevention Strategies Guide*, all of which had previously been demonstrated to be effective in altering risk, protection, and delinquency or other problem behaviors in at least one high-quality research trial.

Because poor implementation quality can decrease intervention effectiveness (Bursik and Grasmick 1993; Fagan and Lindsay 2014; Wilson et al. 2010), CTC provides coalitions with skills and training in how to monitor implementation quality of all selected prevention programs to ensure fidelity to the standards and conditions under which they were developed and found effective. CTC's implementation monitoring system consists of assessment

instruments that track the quantity and quality of information and activities delivered to participants, as well as independent program observations by trained observers, all of which are used to provide corrective feedback to implementers and implementing agencies as necessary (Fagan et al. 2009; Hawkins et al. 2008b). Analyses of these data conducted at multiple points during this trial confirmed that evidence-based prevention programs were delivered with fidelity across all CTC communities (Fagan et al. 2009) and that the CTC prevention system as a whole was delivered with fidelity as well (Quinby et al. 2008).

The Economic Benefits of Effective Crime Prevention

CTC's emphasis on community collaboration and implementation of evidence-based prevention strategies is expected to not only result in significant reductions in youth delinquency and related problem behaviors, but also lead to substantial economic returns on these investments (Hawkins et al. 2002; Kuklinski et al. 2012). In fact, improved youth outcomes have been found in a community-randomized trial involving 12 matched pairs of communities in seven states and a panel of 4,407 youth followed longitudinally (Brown et al. 2009; Hawkins et al. 2008b). At baseline in Grade 5, panel youth from CTC and control communities reported similar levels of delinquency, alcohol use, and cigarette smoking. Significant reductions in the initiation of delinquency favoring the CTC condition were first observed in Grade 7 (Hawkins et al. 2008a), and significant reductions in the initiation of alcohol use and cigarette smoking were first observed in Grade 8 (Hawkins et al. 2009). By Grade 12, cumulative rates of abstinence from these outcomes were still significantly greater among panel youth from CTC compared to control communities (Hawkins et al. 2014).

These sustained improved youth outcomes are expected to produce a number of economic benefits because, as several bodies of research have shown, they lead to cost savings and/or increased revenues to individuals and broader society over long periods of time. Reductions in delinquency initiation have been linked to savings in both justice system and victimization costs (Bureau of Justice Statistics 2013; Lee et al. 2012a; McCollister et al. 2010; Miller et al. 1996; Piquero et al. 2013). Nondelinquent youth are also more likely to graduate from high school (Apel and Sweeten 2009; Hirschfield 2009; Hjalmarsson 2008; Kirk and Sampson 2013), resulting in higher lifetime earnings and tax payments and lower health care costs compared to non-high school graduates (Heckman and Masterov 2007; Lee et al. 2012a; Rouse 2007). Preventing or delaying the incidence of alcohol and tobacco use also has economic implications because the later youth initiate, the less likely they are to experience alcohol use disorders or become heavy regular smokers (Breslau and Peterson 1996; Caulkins et al. 1999; Dawson et al. 2008; Grant 1998; Grant et al. 2001; Hingson et al. 2008; Hingson et al. 2006; Hingson and Zha 2009), with benefits from lower rates of mortality (Centers for Disease Control and Prevention 2008, 2013; Kniesner et al. 2012; Kniesner et al. 2010), greater lifetime earnings and higher tax payments (Alexandre and French 2004; Auld 2005; French et al. 2011a; French et al. 2011b; Jofre-Bonet et al. 2005; Jones and Richmond 2006; Keng and Huffman 2010; Lee et al. 2012a; MacDonald and Shields 2004; Mullahy and Sindelar 1996; Ringel et al. 2006), lower health care costs (Agency for Healthcare Research and Quality 2013; Bouchery et al. 2011; Centers for Disease Control and Prevention 2013; Harwood et al. 1998; Harwood 2000; Harwood and

Bouchery 2004) and, for alcohol use disorders, lower property damage costs (Blincoe et al. 2002; Miller et al. 2006).

Ideally, economic benefits of preventive interventions would be estimated from longitudinal studies comparing economic outcomes in intervention and control populations over the lifetime. However, economic information often is needed more immediately to determine the potential benefits of investing in specific interventions (Lee and Aos 2011; O'Connell et al. 2009; Pew Center on the States 2012). Long-term projection models of economic benefits can help meet this need (Kahn et al. 2010; Lee et al. 2012a; Thomas 2012). The reliability and validity of projected estimates are enhanced by strong research designs and high-quality models (Welsh and Farrington 2000). Randomized designs with well-matched intervention and control groups, intent-to-treat analyses, covariates and controls for clustering, and reliable and valid outcome measures are more likely to lead to valid estimates of effects (Karoly 2012; Lee et al. 2012a). Accurate cost information, including comprehensive assessment of key intervention components and opportunity costs, is important (Foster et al. 2003; Foster et al. 2007; Levin and Schwartz 2007; Yates et al. 2001). The best simulation models (a) have strong theoretical and empirical foundations linking present to future behavior; (b) include parameter estimates based on current epidemiological data, national databases, and research studies; (c) apply a consistent approach to estimating benefits across multiple outcomes; (d) rely on multiple studies to estimate relationships between parameters; (e) account for uncertainty; and (f) capture costs and benefits over their appropriate lifecycles (Karoly 2012; Lee and Aos 2011; Lott Jr 2013; Vining and Weimer 2010).

Early benefit-cost analyses of CTC conducted when panel youth were in Grade 8 indicated that CTC returned $5.30 per dollar spent (Kuklinski et al. 2012). The present study extends that work in important ways. First, this study is based on CTC's long-term sustained intervention effects, achieved when the panel was in Grade 12, 3 years after intervention support to communities for CTC ended. Second, the benefit-cost analysis of CTC described in this paper uses a new comprehensive simulation model developed by the Washington State Institute for Public Policy (Lee et al. 2012a) to project economic benefits of prevention programs and compare them to program investments. It incorporates all the features of the best simulation models, including Monte Carlo methods for estimating the effects of uncertainty and measurement error on estimates. We present estimated benefits, costs, and several summary indicators: CTC's net present value, benefit-cost ratio, internal rate of return, investment risk, and time-to-investment breakeven. This model was not available when the previous analysis of CTC benefits versus costs was conducted.

This study is also one of the first to evaluate the economic impact of a community-based approach to crime prevention, which has been recommended as a strategy to reduce offending and increase the use of effective preventive interventions, but which has rarely been tested for cost effectiveness (O'Connell et al. 2009; Spoth et al. 2013; Welsh and Farrington 2000). It also fulfills many of the recommendations made by Welsh and Farrington (2000), particularly use of a rigorous, randomized research design to assess effects; prospective rather than retrospective collection of data; and estimation of benefits beyond crime. We posited that this long-term follow-up evaluation of CTC would

demonstrate economic benefits to intervention communities, given the results of prior analyses (Kuklinski et al. 2012); CTC's sustained effects on delinquency, alcohol use, and cigarette smoking initiation at Grade 12 (Hawkins et al. 2014); and the fact that some of the developmental prevention programs implemented by CTC communities have previously been shown to be cost beneficial (Lee et al. 2008). However, the degree to which such returns would be found was unclear.

Methods

Data are from the Community Youth Development Study (CYDS), a community-randomized trial of CTC (Hawkins et al. 2008b) undertaken to assess the efficacy of the CTC system. The study consisted of a 5-year intervention phase from 2003 - 2008 followed by a 5-year sustainability phase concluding in 2013. CTC's developer, J. David Hawkins, was principal investigator during the intervention and sustainability phase of the trial. The trial was carried out using an intent-to-treat approach and included rigorous controls at multiple levels of analysis. Twenty-four communities in Colorado, Illinois, Kansas, Maine, Oregon, Utah, and Washington were matched in pairs within state on population size, racial diversity, economic indicators, and crime rates. Paired communities were assigned randomly to intervention or control condition, with the latter conducting prevention services as usual. Communities are small- to moderate-sized incorporated towns with their own governmental, educational, and law enforcement structures (population range: 1,500 – 41,000, M = 15,633, SD 10,147). At the trial's start, none had advanced in using science-based prevention to the point of selecting and implementing evidence-based preventive interventions to address prioritized community risks (for details about community selection and baseline equivalence, see Brown et al. 2009; Hawkins et al. 2008b).

The 12 intervention communities received six CTC trainings over a 9- to 12-month period beginning in summer 2003. Coalition members in these communities learned to use data from anonymous, repeated, cross-sectional student surveys to prioritize risk factors for improvement and to select and implement tested and effective prevention programs to address them. Although CTC communities may choose to implement programs for youth during the prenatal period to age 18, in this study, communities were asked to focus prevention programs on youth ages 10 to 14 years (Grades 5 through 9) and their families and schools so that possible effects on substance use, delinquency, and other outcomes could be observed within the initial 5-year trial. Starting with the 2004 - 2005 school year when the panel was in Grade 6 and continuing through Grade 9, CTC communities implemented one to five tested, effective preventive programs per year (M = 2.75, SD = 0.89) to address prioritized risk factors. The particular set of interventions varied across communities, consistent with the CTC framework, and included primarily universal services designed to be implemented with the general population. For example, universal school-based programs included Life Skills Training and Lion's Quest Skills for Adolescence, and family-based programs included Strengthening Families 10-14 and Guiding Good Choices. After-school programs included both universal (e.g., Stay SMART) and selective (e.g., tutoring programs and the Big Brothers/Big Sisters mentoring program) interventions. A comprehensive list of interventions is provided in Fagan et al. (2009). Technical assistance through Grade 9 was provided via emails, weekly phone calls, and site visits to ensure faithful implementation of

CTC and prevention programs. The 5-year sustainability trial began immediately thereafter and evaluated CTC's enduring effects.

A sample of 4,420 youth received parental consent to participate in the study (76.4% of the eligible population; 76.1% of eligible students in CTC and 76.7% in control communities). Of these, 4,407 completed measures in Grades 5 or 6 and comprise the longitudinal panel followed throughout the study even if they left the community during the trial (Brown et al. 2009). The sample is 50% male, 20% Hispanic/Latino, 64% non-Hispanic White, 3% non-Hispanic African American, 5% non-Hispanic Native American, 1% non-Hispanic Asian American, and 6% other. By Grade 12, an active still-living sample of 4,398 youth remained.

Analyses through Grade 12 found significantly higher rates of cumulative abstinence from delinquency, alcohol use, and cigarette smoking in CTC panel youth compared to those in control communities, among youth who had not initiated these behaviors at baseline (Hawkins et al. 2014). Analyses included individual (age, race, Hispanic ethnicity, parental education, baseline attendance at religious services, baseline rebelliousness) and community-level (student population, percentage eligible for free or reduced-priced lunch) covariates and controlled for nesting of youth in communities. These effects are summarized in Table 1 and are the focus of the benefit-cost analysis presented in this paper.

Measures

Sustained abstinence from delinquency, alcohol use, and cigarette smoking— Participants in all 24 communities completed the CTC Youth Development Survey annually from Grades 5 through 12, except in Grade 11. This self-administered survey asks youth about attitudes, experiences, and behaviors, and includes assessments about family, school, peer, and community risk and protective factors (Brown et al. 2009). Each year of the survey, panel youth reported their participation in *seven delinquent behaviors:* stealing, property damage, shoplifting, attacking someone with the intent to harm, carrying a handgun, being arrested, and beating up someone so badly he/she probably needed medical attention. For example, they were asked “How many times in the past year (12 months) have you attacked someone with the idea of seriously hurting them?” Response options were in the form of frequencies, e.g., Never, 1 or 2 times, 3 to 5 times, and so on. Sustained abstinence rates at Grade 12 among youth who had not initiated delinquency at baseline reflected all youth who did not report any of the seven delinquent behaviors in any survey wave following baseline assessment. Youth reported *lifetime use of alcohol and cigarettes* by responding Yes or No to “Have you ever had more than just a sip or two of beer, wine, or hard liquor (for example, vodka, whiskey, or gin)?” and “Have you ever smoked cigarettes?” Responses at Grade 12 were used to calculate differences in sustained abstinence through Grade 12 among youth who had not initiated alcohol use or cigarette smoking, respectively, at baseline.

CTC implementation cost—Investments in CTC were made in four major categories: (1) community coalition (CTC coordinator, coalition meetings); (2) intervention programs (curricula, materials, staff training, program implementation); (3) training, technical

assistance, and implementation monitoring; and (4) other investments (cash and in-kind contributions). Average costs per community for the 5-year intervention are summarized in Table 2. Further information about investments in CTC during the implementation trial and details about cost data sources can be found in Kuklinski et al. (2012).

Data Analysis Strategy

Benefit-cost analysis compared the long-term economic benefit per youth in CTC communities to the economic cost per youth of implementing CTC. We performed our analysis with a benefit-cost analysis software tool developed by the Washington State Institute for Public Policy (WSIPP) to help policymakers understand which programs are effective in improving public outcomes and what return on investment taxpayers could expect from investing public dollars in these interventions. The tool, which is described in detail in a technical appendix (Washington State Institute for Public Policy 2013), is capable of conducting benefit-cost analyses for programs in 10 areas: general prevention, crime, K-12 education, child maltreatment, substance abuse, mental health, public health, public assistance, employment and workforce development, and health care. The benefit-cost model consists of an integrated set of estimates and computational routines that generate four benefit-cost summary statistics: net present value, benefit-cost ratio, internal rate of return, and investment risk. The model takes a prevalence-based approach, estimating benefits that derive from the relationship between improved outcomes today and future prevalence of behaviors, disorders, or events that have economic impact. Strengths include an internally consistent approach to generating estimates across different program areas, long-run benefits and costs, benefits summed across multiple outcomes with control for possible double counting, benefits and costs from multiple perspectives (e.g., participants, taxpayers, other beneficiaries, other indirect benefits), estimation of benefits from direct and indirect economic consequences of an outcome, and estimates of investment risk given various sources of uncertainty (e.g., effect sizes, inflation rates, and other parameter estimates). We summarize the tool's application to our analysis below, and we provide additional detail about the parameters that generated the benefit-cost results reported in this study in an appendix available online.

The model's validity has been confirmed in several ways. First, it has been subjected to external review by an independent panel of experts. Second, invited publications have been subject to the peer review process of several scholarly journals (Drake 2012; Drake et al. 2009; Lee et al. 2012b). Third, estimates produced by the model are consistent with estimates produced independently by other researchers. Finally, WSIPP also receives feedback regularly from users which is incorporated in periodic model updates. Interested readers should consult WSIPP's comprehensive technical manual for more detail about the model and software tool (Washington State Institute for Public Policy 2013).

The software tool required information about intervention costs per youth and intervention effects (Lee et al. 2012a). Costs per youth are described below. Intervention effect sizes reported in Table 1 were entered into the model and were the basis for benefits estimates. The model's approach to estimating benefits in each outcome area is also described below. Comparisons between per-youth benefits and costs were made after discounting them to the

2004 intervention start and adjusting for inflation. Estimates were reported in 2011 dollars, the latest available in the software tool. CTC would be assessed as "cost beneficial" if total benefit per youth exceeded cost per youth or the ratio of benefit to cost per youth exceeded 1. Because CTC is a universal prevention system, emphasizing broad delivery of prevention services to community residents, the simulation model calculated benefits for a general (in contrast to a high-risk) population.

Cost-per-youth estimate—During the intervention phase of the study, CTC communities primarily delivered programs to youth in Grades 5 through 9 (ages 10 – 14). Prevention programs expected to have impacts on youth outcomes were not widely delivered to youth in Grades 10 - 12 during the sustainability phase. *Cost-per-youth* calculations were, therefore, based on investments made during the intervention phase to total all youth in each CTC community ages 10 – 14 (United States Census Bureau 2000). As described above, investments in coalitions, prevention programs, training, technical assistance, and monitoring, and other contributions were included in cost estimates. An estimate of the annual CTC *cost per youth* was calculated as the weighted average of the 12 community cost-per-youth estimates (total investments in CTC/total youth ages 10 – 14 years, with the result divided by 5 years of intervention); weights were the youth population ages 10 - 14 in each community. The weighted average was entered into the model, along with the specification that the intervention occurred for 5 years. Costs per youth varied across communities, and so Monte Carlo analysis incorporated the weighted cost ± 35% range. This range was chosen because it included costs in all intervention communities except for the extreme high and low ends of the cost distribution. Control community costs were $0 because the marginal prevention activity in CTC compared to control communities was the CTC intervention (Hawkins et al. 2008b).

Approach to estimating benefits—Models for *estimating benefits* are explained in detail in the technical manual (Washington State Institute for Public Policy 2013) (Crime/delinquency: pages 26 - 57, Substance Use: pages 66 – 79), including assumptions, inputs, parameter estimates, benefits algorithms. We limit discussion here to general estimation procedures and describe the benefit components for each intervention effect, but the online appendix to this study contains additional detail about model assumptions, inputs, and parameters. For each significant CTC effect, adjusted odds ratios were converted to standardized mean difference effect sizes using Cox's d transformation (Sanchez-Meca et al. 2003). Effect-size standard errors were also calculated (Lee et al. 2012a). These effect sizes were used to estimate CTC's benefit, which consisted of avoided costs (e.g., reduced alcohol treatment costs) or revenue generated (e.g., increased earnings) over time, per panel participant in CTC communities, because outcomes were improved compared to controls. Standardized mean difference effect sizes were used to calculate the unit change in an outcome over its relevant lifecycle (e.g., crime through age 59, when crime rates are projected to have diminished to near zero). Benefit streams were estimated by multiplying the unit change by the marginal cost of the problem behavior avoided in each year of the lifecycle (criminal justice system costs through age 59; victimization, health care, and property loss costs through age 100; earnings through age 65) (Lee et al. 2012a). Benefits were discounted to intervention start to yield a present value benefit for each outcome.

Benefits from preventing delinquency initiation: Criminal justice system savings estimates incorporated four types of inputs: (1) unit cost of police/sheriffs (per arrest), courts and county prosecutors (per conviction), and corrections facilities (per average daily population), including marginal operating and capital costs; (2) units used per crime type, including sentencing probabilities, years per sentence, and sentencing changes when recidivism occurs; (3) likelihood of arrest, conviction, and recidivism for different populations (e.g., juvenile vs. adult offender) and different types of crime; and (4) victimization costs per unit of crime, including tangible (e.g., medical and mental health treatment, property damage, lost earnings) and intangible (e.g., pain, suffering, lost quality of life). These categories incorporate data sources and methodologies described in greater detail in the online appendix and WSIPP's technical manual (Washington State Institute for Public Policy 2013). Victimization costs are based on the jury compensation approach (Cohen 1998) which utilizes jury awards form personal injury trials to estimate pain, suffering, and psychological distress costs in crime victims for the four categories of crime with the highest intangible costs: rape/sexual assault, aggravated assault, robbery, and murder. The model's intangible cost estimates for the first three categories were based on the work of McCollister, French, and Fang (2010), whose estimates reflect the difference between total jury awards and direct, tangible costs incurred by crime victims and presented at trial. To estimate intangible costs of homicide, the model incorporates the work of McCollister, French, and Fang (2010), as well as value of a statistical life estimates from Viscusi and Aldy (2003), which, at over $8 million per murder in 2008 dollars, are far more comprehensive than tangible lost lifetime earnings experienced from premature death. Benefit streams related to increased high school graduation (Apel and Sweeten 2009; Hirschfield 2009; Hjalmarsson 2008; Kirk and Sampson 2013) (increased earnings, higher taxes paid, health care cost savings) were adjusted by a factor of .39 (*SE* = .09) to account for delinquency's indirect effects on this outcome.

Benefits from preventing alcohol use and tobacco use initiation: Benefits were estimated from indirect effects of sustained cumulative abstinence (i.e., lower cumulative rates of initiation) on alcohol use disorders or heavy regular smoking and their associated morbidity (emergency department visits, treatment costs, health care costs, foregone earnings and taxes) and mortality-related (foregone earnings, decreased tax revenue, value of a statistical life) (Kniesner et al. 2012; Viscusi and Aldy 2003) costs (Breslau and Peterson 1996; Caulkins et al. 1999; Dawson et al. 2008; Grant 1998; Grant and Dawson 1997; Hingson et al. 2006). Alcohol benefits models included traffic crash and property loss costs avoided (Blincoe et al. 2002). Smoking benefits models included health care cost savings from premature mortality (Sloan 2004). Benefits streams related to alcohol use disorders were adjusted by a factor (-.02) reflecting the extent to which increasing the age of initiation reduces the likelihood of developing an alcohol disorder. The corresponding factor for heavy regular smoking and youth smoking initiation was −.025. Please see the online appendix to this study as well as the technical manual (Washington State Institute for Public Policy 2013, pp. 66-79) for further information about the methodologies, parameter estimates, and computational procedures for estimating benefits from reducing substance use initiation.

Discounting and deadweight cost of taxation—Benefit streams were *discounted* at an annual rate of 3.5% (range: 2% - 5%). Costs were converted from nominal to constant 2004 dollars using the implicit price deflator for personal consumption expenditures and were also discounted to 2004. To bring estimates closer to present-day dollars, 2004 estimates were converted to 2011 dollars.

Analyses adjusted for the *deadweight cost of taxation* (the economic loss to society per tax dollar incurred or gained when taxes are avoided) at a rate of 50% (range: 0% - 100%) (Boardman et al. 1996; Heckman et al. 2010).

Benefit-cost analysis summary—Results were based on 1,000 Monte Carlo simulations. Benefits to stakeholders (e.g., participants, taxpayers, other beneficiaries) were calculated, as were benefit sources (e.g., benefits from the prevention of delinquency initiation vs. benefits from the prevention of alcohol use initiation). Monte Carlo results were used to calculate confidence intervals around estimates. CTC's total benefit was calculated conservatively to avoid the possibility of double counting when, for example, a benefit such as participant earnings could be influenced by the prevention of delinquency, alcohol use, and/or cigarette smoking initiation. It assumes that the total benefit in each benefit category influenced by multiple outcomes can be no smaller than the largest benefit from a single outcome (e.g., total earnings benefit is the maximum of the earnings benefits from delinquency or alcohol or cigarette smoking effects). This approach is conservative because it does not consider the extent to which effects are independent, nor does it estimate their possible additive effect on economic harms. The *net present value* reflects discounted benefit per youth minus cost per youth; a positive value is cost beneficial. The *benefit-cost ratio* is the discounted benefit per youth divided by cost per youth; values greater than 1 are cost beneficial. The *internal rate of return* is the rate at which discounted benefits equal discounted costs; higher values are desirable. The *risk assessment* reflects the percentage of Monte Carlo simulations producing a positive net present value or economically favorable outcome (Evidence Based Practice Institute 2013). The *time to net positive investment* was calculated from model-generated cumulative cash flows, which were discounted at 3.5% per year.

Sensitivity analyses—Because of concerns that developer involvement in the implementation and evaluation of an intervention, as was the case in the CTC trial, enhances effect sizes compared to what is likely to occur without developer involvement (Eisner 2009; Lee et al. 2012a; Petrosino and Soydan 2005), we followed WSIPP procedures and conducted sensitivity analyses in which effect sizes were reduced by 50% while keeping standard errors at original levels. We report results from our unadjusted analysis and sensitivity analysis alongside each other in the results section.

Results

As previously noted, Table 1 shows CTC's significant effects on sustained cumulative abstinence from delinquency, alcohol use, and cigarette smoking, as well as the standardized mean difference effect sizes and standard errors used for benefits estimates (Hawkins et al. 2014). Unadjusted effects and effects adjusted for developer involvement are both reported.

The latter are half as large as the unadjusted effects, but the standard errors are the same, implying relatively greater uncertainty in effect sizes once the adjustment is made.

Table 2 reports average costs per community of $745,276 (discounted 2011 dollars) for 5 years of CTC implementation, an average of $149,055 per year. The largest share of costs was for community coalitions. At $275,930 over 5 years, they represented 37% of the total. The cost of one full-time staff person per coalition (the CTC coordinator), considered instrumental to the smooth functioning of the coalition and its activities, comprised much of this total (detail not shown). Prevention program costs were $263,908 over 5 years and 35% of the average total investment in CTC. Costs covered program materials, staff training prior to implementation, staff time delivering the program, and, at times, incentives, meals, child care, and other supports for participants. Training, technical assistance, and monitoring costs, thought important to ensuring sustained high-quality implementation of the CTC system and evidence-based programs, were also significant, totaling $173,873 across 5 years and representing 23% of the total. Coalitions generated $31,564 in additional investments to CTC, approximately 4% of the total, primarily in Years 4 and 5 of the intervention.

Benefits per youth projected to accrue over time from each CTC outcome are reported in Table 3 by source (e.g., earnings, health care) as well as by stakeholder (e.g., participant, taxpayer). Values are averages across 1,000 Monte Carlo simulations, discounted to the intervention start in 2004 and reported in 2011 dollars to bring them closer to present day. Confidence intervals are also shown. As the table shows, economic benefits from CTC's effect on delinquency are substantial: $897 in avoided criminal justice system costs, $1,729 in victimization savings, and $1,850 in indirect earnings and health care benefits from increased high school graduation. The large benefits from preventing delinquency reflect the high cost of crime, including tangible system costs that accrue to taxpayers and significant costs to crime victims, which the benefits model suggests can be avoided by high-quality implementation of CTC. The substantial indirect benefits arising from high school graduation illustrate another positive economic outcome of CTC's effect on delinquency, with over half of this benefit accruing to participants in the form of increased earnings over time. As Table 3 shows, CTC's effect on sustained abstinence from delinquency is estimated to confer substantial benefit on multiple stakeholders: participants, taxpayers, and crime victims. Deadweight cost of taxation benefits, captured in the “Other Indirect” line item are also high because of welfare gains when taxpayer-financed criminal justice system costs are reduced as a result of the intervention.

Projected benefits from reducing youth alcohol initiation sum to $287. Benefits from preventing cigarette smoking in youth total $45. These benefits arise from CTC's indirect effects on alcohol use disorders and heavy regular smoking, which are estimated to be lower in youth exposed to CTC because of their significantly higher rates of abstinence from these forms of substance use through high school. The table indicates that the largest share of benefits from preventing alcohol use among youth occurs through earnings, while from cigarette smoking, a somewhat larger share of benefits arises from avoiding health care costs. Though not unimportant, benefits from delayed initiation of smoking and drinking are far smaller than benefits from preventing delinquency initiation even though the effect sizes were fairly similar. The difference reflects in part differences in the costs of alcohol use

disorders and heavy regular smoking compared to the cost of delinquency. However, it also reflects the small relationship between sustained abstinence from substance use and subsequent disorder; the model attributes only 2% of the cost of an alcohol use disorder and 3% of the cost of heavy regular smoking to a 1 standard deviation change in substance use initiation (Washington State Institute for Public Policy 2013) based on WSIPP's review of research causally linking early substance use initiation to later disorder.

Table 3 also reports benefits from the sensitivity analysis, undertaken because of concern that subsequent “real world” implementation might lead to smaller effects than those experienced in a research trial like the CYDS. As noted, effect sizes were halved but standard errors remained the same as in the main analysis. Not surprisingly total benefits for each outcome are approximately half of the benefits from the unadjusted analysis. The pattern of benefits remains the same, with substantial benefits related to CTC's effects on delinquency and far lower benefits from CTC's effects on alcohol use and cigarette smoking.

Table 4 summarizes the benefit-cost results. Total benefits, calculated conservatively, were $4,477, equivalent to delinquency benefits because delinquency benefits represented the largest benefit from each source. CTC's weighted average implementation cost was $556 per youth for 5 years of intervention, or $112 annually. The 35% band around per-youth costs resulted in an implementation cost range of $376 to $761 per youth. Table 4 also includes five summary statistics. CTC's net present value of $3,920 is positive, and the benefit-cost ratio indicates over $8 returned per dollar invested. CTC's internal rate of return is also favorable, at 21%, and is estimated to be a low-risk investment because all of the 1000 Monte Carlo simulations generated a positive (i.e., cost-beneficial) result. Finally, discounted total benefits were expected to match and then exceed system investments beginning in Year 9.

Results from the sensitivity analysis also indicated that CTC was a cost-beneficial, low-risk investment. Although the net present value decreased to $1,749 per youth, it remained well above the $0 threshold, and the benefit-cost ratio indicated over $4 of benefit per dollar invested. At 12%, the rate of return was smaller but still favorable, and investment risk remained extremely low, with 99% of 1000 Monte Carlo simulations generating a positive net present value. In this scenario, however, system investments were not fully recouped for 13 years, compared to 9 when CTC's effects were not adjusted.

Discussion

A growing body of literature has identified economic gains from investing in crime prevention programs (Heckman et al. 2010; Lee et al. 2012a; Nagin 2001; Reynolds et al. 2011), but economic analyses of community-based systems that build community infrastructure to choose and implement evidence-based programs for reducing delinquency and substance use among youth across entire communities have been rare (Welsh and Farrington 2000). The present analyses indicate that CTC is a cost-beneficial system for reducing delinquency, underage drinking, and youth tobacco use initiation community wide. The economic gain to society from CTC evidenced in this evaluation was substantial, ranging from $1,749 to $3,920 per youth, with the largest share coming from reductions in

delinquency and subsequent criminal justice system and victimization savings, as well as increased earnings and taxes from indirect effects on high school graduation. Economic returns were buttressed by earnings gains and health care savings from reductions in youth alcohol use initiation, and to a lesser degree, by reductions in youth smoking initiation. Sensitivity analyses revealed that even when effect sizes were halved because of concern that developer involvement may have increased effect sizes compared to those likely to be achieved in replications without such involvement, CTC remained a cost-beneficial and low-risk investment.

CTC's cost-beneficial impact follows from its significant effects on three outcomes: increases in sustained abstinence from delinquency, alcohol use, and tobacco use through Grade 12, observed in panel youth exposed to CTC compared to panel youth from control communities. Findings from this randomized trial lend support to ecological and developmental theories of crime that suggest that by altering community social processes, improvements in delinquency, crime, and other problem behaviors can be achieved (Catalano and Hawkins 1996; Sampson et al. 1997; Shaw and McKay 1942). In CTC, social processes were influenced via the activation of broad-based coalitions of community volunteers, as well as through the selection and implementation of preventive interventions aimed at reducing widespread risks and enhancing protection in the community. Interventions were implemented over several years in multiple environments in which youth development occurs, including family, school, and community settings.

Benefit-cost estimates reflect the overall effect of CTC on each outcome estimated across 12 intervention communities, regardless of variation in specific evidence-based programs chosen and implemented in different CTC communities. The CYDS study design allows a test of the CTC system as a whole, including its component elements of community-chosen evidence-based preventive interventions. The study design does not allow attribution of the effects reported in this study to a single part of the CTC system or to a specific combination of evidence-based programs (Hawkins et al. 2008b). This inference is supported by research by Brown and colleagues (2013a), which has indicated that CTC's impact on youth outcomes in this trial was mediated by community-level changes in the adoption of a science-based prevention approach. Adoption was a multifaceted construct taking into account awareness of prevention science constructs; the use of epidemiological data to understand community-specific risk, protection, behavioral health outcomes, and existing prevention resources; the selection and implementation of evidence-based prevention programs that fill gaps in existing services to address those concerns; and monitoring that ensures sustained, high-quality implementation of the CTC system and prevention programs. Training and support to implement the CTC system increased adoption of a science-based approach to prevention in CTC communities, which mediated CTC's effects on youth outcomes (Brown et al. 2013a; Rhew et al. 2013). This research suggests that the CTC system, including local choice of tested and effective preventive interventions implemented, and not some specific combination of preventive interventions, produced the results and economic benefits reported here.

This study and other evaluation findings from the CYDS show that, in contrast to some other community mobilization efforts to prevent crime and delinquency that were

unsuccessful (Bursik and Grasmick 1993; Rosenbaum and Schuck 2012; Wilson et al. 2010), the CTC community mobilization system guided by prevention science was effective in improving youth outcomes and is also economically attractive. CTC provides a structure and training process that helps coalitions avoid implementation pitfalls such as inability to mobilize community members or use evidence-based preventive interventions. In addition to emphasizing science-based prevention and building knowledge and capacity in coalition members, CTC training and ongoing technical assistance help support healthy coalition functioning necessary for sustained effectiveness (Brown et al. 2013b; Feinberg et al. 2008; Feinberg et al. 2004; Shapiro et al. 2013).

Findings add to the literature assessing the cost effectiveness of community-based approaches to crime and delinquency prevention and document that CTC is a cost-beneficial, low-risk investment. The current analyses suggest that investments made in CTC communities to mobilize broad-based coalitions and implement a science-based prevention system can generate positive financial returns. However, communities must be prepared to spend significant human and financial resources on high-quality implementation, including investments in training and technical assistance, and in funding a community coordinator to facilitate coalition operations and prevention activities. Without careful attention to implementation, these types of broad-based, locally driven prevention efforts can fail to achieve desired outcomes (Komro et al. 2008; Rosenbaum and Schuck 2012; Wilson and Chermak 2011). The results of this evaluation indicate that those investments can be worthwhile, contributing to intervention effects estimated to produce sizable economic returns.

Strengths and Limitations of the Benefit-Cost Analysis

This benefit-cost analysis has both strengths and limitations. As recommended by Welsh and Farrington (2000), analyses were based on information collected during a rigorous randomized controlled evaluation, which increases confidence in the results. Benefits estimates rely on projections rather than on actual economic outcomes observed over the lifetime of participants. However, it is noteworthy that some long-term follow-up studies have found that benefits increased as participants aged relative to earlier projections (Belfield et al. 2006; Reynolds et al. 2011).

The present conclusions are strengthened by the use of Monte Carlo analysis and algorithms designed to make conservative and defensible economic projections (Lee et al. 2012a). For example, effects were discounted to control for possible upward bias introduced when program developers are involved in program evaluation (Lee et al. 2012a; Petrosino and Soydan 2005). In addition, benefits from preventing youth drinking initiation do not include all acute consequences of youth drinking, only those resulting from preventing alcohol use disorders.

Importantly, the present analyses estimate a broader array of benefits than those directly associated with the operation of the criminal justice system. By accounting for benefits to victims of crime and benefits arising from the indirect effect of crime on high school graduation and subsequent earnings and health care costs, the study provides a more realistic and complete picture of benefits to society (Nagin 2001; Welsh and Farrington 2000), which

should increase the appeal of the findings to community leaders and policy makers (Manning et al. 2013). However, benefits estimates draw on a mix of national and Washington State data (Lee et al. 2012a), leading to some imprecision in estimates. This study was conducted in small- and medium-sized towns, raising questions about the generalizability of findings to larger urban communities.

Conclusion

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 through Grade 12. Findings are based on sustained significant intervention effects on cumulative abstinence from delinquency, alcohol use, and cigarette smoking observed in a randomized controlled trial of the CTC prevention system. The trial found that the CTC community mobilization system was effective when coalitions were provided adequate training and technical assistance to select, implement, monitor, and sustain high-quality implementation of evidence-based prevention programs chosen to address community-specific profiles of risk, protection, and problem behavior, and to use the social development strategy to guide interactions with children. The potential for this approach to generate long-term economic benefits that exceed implementation costs provides additional support for the efficacy of the CTC prevention system.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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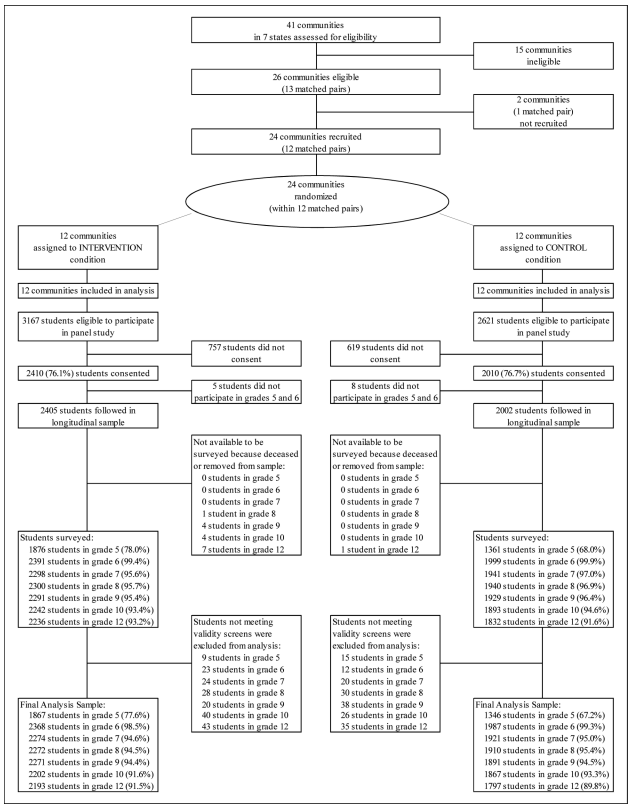

Figure 1.
Flow of communities and participants in the randomized trial.

Table 1

CTC's effects on sustained abstinence from delinquency, alcohol use, and cigarette smoking through Grade 12 among baseline non-initiators

	Non-initiators at baseline[a]		Sustained abstinence through Grade 12		Model-estimated CTC effect on cumulative initiation[b]			Benefit-cost analysis inputs: Effects from Grade 12 analysis[c]		Benefit-cost analysis inputs: Developer involvement adjustment[d]	
Outcome	**CTC**	**Control**	**CTC**	**Control**	**AOR**	**95% CI [low; high]**	***p***	**Effect size**	**SE**	**Effect size**	**SE**
Delinquency	80.1%	76.9%	41.7%	33.0%	1.29	[1.03; 1.61]	.031	-0.154	0.043	-0.077	0.043
Alcohol use	79.7%	76.7%	32.2%	23.3%	1.43	[1.01; 2.04]	.047	-0.218	0.052	-0.109	0.052
Cigarette smoking	92.6%	90.5%	49.9%	42.8%	1.25	[1.00; 1.56]	.047	-0.135	0.039	-0.068	0.039

CTC = Communities That Care; AOR = adjusted odds ratio (CTC versus control condition); CI = confidence interval around the adjusted odds ratio; *p* = probability for *t*-test.

[a] There were no significant differences at baseline between CTC and control group.

[b] Estimated using generalized linear mixed model and adjusted for student (age, race, Hispanic ethnicity, parental education, baseline attendance at religious services, baseline rebelliousness) and community (student population, percentage eligible for free or reduced-priced lunch) characteristics.

[c] Effect sizes are calculated by transforming AORs using the Cox's *d* transformation.

[d] Effect sizes are reduced by 50% in sensitivity analyses because of the possibility that the involvement of CTC's developer in the trial resulted in stronger effects than would be achieved in subsequent implementation not involving CTC's developer.

Table 2

Costs of implementing CTC for five years (discounted 2011 dollars)

Cost Category	Year 1 15 months (3/03-6/04)	Year 2 12 months (7/04-6/05)	Year 3 12 months (7/05-6/06)	Year 4 12 months (7/06-6/07)	Year 5 9 months (7/07-3/08)	Grand Total
Community coalition & intervention program costs						
Coalition	$64,494	$60,180	$60,628	$54,662	$35,966	$275,930
Intervention programs	11,551	71,408	79,560	66,057	35,333	263,908
Training, technical assistance, & implementation monitoring (TTAM)						
CTC trainings	9,519	8,964	8,434	7,927	7,442	42,287
Wages, benefits	19,974	23,097	25,707	23,926	14,903	107,607
Rental space	1,947	2,102	2,159	1,398	836	8,442
Travel	912	456	1,253	869	551	4,041
Phone	308	277	243	165	121	1,114
Targeted mail	0	399	849	827	293	2,368
Student survey	3,048	0	2,618	0	2,348	8,014
Other investments						
Additional funding	0	0	0	9,685	10,282	19,967
In-kind donations	0	1,519	2,546	2,815	3,830	10,710
Cash donations	49	274	435	129	0	887
Subtotal costs						
Coalition	$64,494	$60,180	$60,628	$54,662	$35,966	275,930
Intervention programs	11,551	71,408	79,560	66,057	35,333	263,908
TTAM	35,709	35,295	41,262	35,113	26,495	173,873
Other	49	1,793	2,981	12,628	14,113	31,564
Average cost per community	$111,803	$168,675	$184,431	$168,459	$111,907	$745,276
SD	20,436	14,608	12,008	24,059	15,159	43,875

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Table 3

Benefits from CTC effects on sustained abstinence from delinquency, alcohol use, and cigarette smoking through Grade 12

	CTC effects at Grade 12							Sensitivity analysis: Developer involvement adjustment - Effects reduced by 50%	
	Criminal Justice	Victimization	Earnings	Health Care	Property Loss	Total	95% Confidence Interval [low; high]	Total	95% Confidence Interval [low; high]
Delinquency									
Participants			$960	($17)		$943	[$919; $967]	$486	[$467; $506]
Taxpayers	$598		$353	$133		$1085	[$1070; $1100]	$562	[$550; $574]
Others[a]		$1729		($100)		$1629	[$1605; $1653]	$836	[$813; $859]
DWC[b]	$299		$454	$67		$820	[$803; $837]	$421	[$410; $433]
Total	$897	$1729	$1767	$83		$4477	[$4413; $4540]	$2305	[$2254; $2357]
Alcohol use									
Participants			$176	$4		$181	[$168; $193]	$87	[$81; $94]
Taxpayers	$1		$65	$13		$80	[$75; $84]	$40	[$37; $42]
Others[a]		$4		$10	$1	$15	[$15; $16]	$13	[$12; $13]
DWC[b]	$1		$3	$7		$11	[$10; $11]	$6	[$6; $6]
Total	$2	$6	$245	$34	$1	$287	[$269; $304]	$145	[$136; $154]
Cigarette smoking									
Participants			$4	$3		$7	[$7; $8]	$3	[$3; $3]
Taxpayers			$1	$9		$10	[$10; $11]	$4	[$4; $5]
Others[a]				$9		$9	[$8; $10]	$4	[$3; $4]
DWC[b]			$14	$5		$19	[$17; $20]	$7	[$6; $7]
Total			$20	$25		$45	[$43; $48]	$17	[$16; $19]

[a] This category includes benefits to crime victims and private health insurance companies.

[b] This category includes benefits related to the deadweight cost (DWC) of taxation, second-hand smoking benefits, and avoided household production losses when early mortality is reduced.

Table 4

Benefit-cost analysis of CTC through Grade 12

	CTC effects through Grade 12		Sensitivity analysis: Developer involvement adjustment - Effects reduced by 50%	
		95% Confidence Interval		95% Confidence Interval
	Total	[low; high]	Total	[low; high]
Benefits				
Participants	$943	[$919; $967]	$486	[$467; $506]
Taxpayers	$1085	[$1070; $1100]	$562	[$550; $574]
Others[a]	$1629	[$1605; $1653]	$836	[$813; $859]
DWC[b]	$820	[$803; $837]	$421	[$410; $433]
Total	$4477	[$4413; $4540]	$2305	[$2254; $2357]
Costs	($556)	[($551); ($561)]	($556)	[($551); ($561)]
Net present value	$3920	[$3857; $3984]	$1749	[$1698; $1801]
Benefit-cost ratio[a]	8.22	[8.08; 8.36]	4.23	[4.13; 4.33]
Internal rate of return	21%		12%	
% of Monte Carlo runs in which NPV > $0	100%		99%	
Years to investment breakeven point	9		13	

[a]This category includes benefits to crime victims and private health insurance companies.

[b]This category includes benefits related to the deadweight cost (DWC) of taxation, second-hand smoking benefits, and avoided household production losses when early mortality is reduced.