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Effects of the Communities That Care Model in Pennsylvania on Change in Adolescent Risk and Problem Behaviors

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Abstract Despite the public health burden of adolescent substance use, delinquency, and other problem behavior, few comprehensive models of disseminating evidence-based prevention programs to communities have demonstrated positive youth outcomes at a population level, capacity to maintain program fidelity, and sustainability. We examined whether the Communities That Care (CTC; Hawkins and Catalano 1992) model had a positive impact on risk/protective factors and academic and behavioral outcomes among adolescents in a quasi-experimental effectiveness study. We conducted a longitudinal study of CTC in Pennsylvania utilizing biannual surveillance data collected through anonymous in-school student surveys. We utilized multilevel models to examine CTC impact on change in risk/protective factors, grades, delinquency, and substance use over time. Youth in CTC communities demonstrated less growth in delinquency, but not substance use, than youth in non-CTC communities. Levels of risk factors increased more slowly, and protective factors and academic performance decreased more slowly, among CTC community grade-cohorts that were exposed to evidence-based, universal prevention programs than comparison grade cohorts. Community coalitions can affect adolescent risk and protective behaviors at a population level when evidence-based programs are utilized. CTC represents an effective model for disseminating such programs.

Keywords Deliquency · Academic performance · Prevention

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Effects of the Communities That Care Model in Pennsylvania

For communities interested in a public health approach to prevention of alcohol, tobacco and other drugs (ATOD), there are few evidence-based models of broad community-level planning and action that have demonstrated effectiveness. Although numerous evidence-based prevention (EBP) programs have been developed (Spoth et al. 2008), their penetration is still low and they are often not sustained or implemented with sufficient fidelity. A central goal for prevention efforts is to develop effective community-wide models that lead to coordinated assessment, planning, and implementation of EBPs to replace the often duplicative and non-systematic programming that exists in most US communities. Until recently, no system or model of disseminating EBPs to communities has shown success in terms of potential reach, maintenance of program fidelity, and sustainability.

Over the past decade, we have been examining the processes and outcomes of Pennsylvania's statewide roll-out of Communities That Care (CTC). This coordinated statewide initiative began in the mid-1990s and has reached over 120 communities. CTC involves the formation of collaborative community partnerships among community stakeholders to spearhead adoption and support of EBPs that have been shown to reduce risk and enhance protective factors for adolescent behavior problems (e.g., substance use, delinquency, violence, school drop-out). CTC focuses on a wide range

of risk and protective factors, and relevant EBPs address not only risk during the teen period, but risk and protective factors that occur around birth and early childhood as well.

The CTC model has demonstrated initial evidence of efficacy in a recent report from a randomized trial (Hawkins et al. 2007). However, the evidence from that study is based on only 12 communities implementing the CTC model (Hawkins et al. 2007). Moreover, a model's ability to demonstrate effects in a researcher-controlled "efficacy" trial may not translate into effective outcomes in real-world conditions (Woolf 2008). Thus, an "effectiveness" study of CTC was an important indicator of the model's real-world potential.

The PA initiative provides a long-term opportunity to understand CTC in a non-experimental, large-scale implementation under real-world conditions (Feinberg et al. 2002, 2004a, b, 2008). We recently reported a quasi-experimental study of the effectiveness of CTC by comparing student reports on risk factors and problem behaviors across CTC and non-CTC communities (Feinberg et al. 2007a). Utilizing data from PA's youth behavior surveillance survey, findings demonstrated that youth in CTC communities reported lower rates of risk factors and problem behaviors than youth in comparison communities.

That report was significant because it provided the first evidence that large-scale dissemination of a community coalition approach to ATOD prevention could be effective, in contrast to a number of prior reports showing that other community coalition initiatives showed few positive effects (Hallfors et al. 2002; Klerman et al. 2005; Roussos and Fawcett 2000). The evidence of CTC effectiveness as well as that of another community-based dissemination model (PROSPER; Spoth et al. 2007), suggests that effectiveness may require three elements: utilization of EBPs, sufficient technical assistance support, and fidelity of implementation (see Hallfors et al. 2002).

A drawback of the PA study was its quasi-experimental nature: Communities were not randomly assigned to condition, but rather self-selected into participation in the state's CTC training and support program (described below). It was possible that communities with fewer problems had self-selected into CTC. One strong argument against this threat to validity was that results proved much stronger when analyses compared CTC community grade cohorts that were targeted by universal EBPs to all other grade cohorts. Nonetheless, a stronger test of effectiveness under real world conditions would be to examine community-level *change* in youth risk and outcomes over time. That is, would CTC activity lead to a change in youth risk and problem behavior, such as delinquency and substance use? Here we utilize a longitudinal design in which an earlier wave of data acts essentially as a control for each grade surveyed in a community, allowing us to examine within-unit change in levels of risk/protection and outcomes (delinquency, academic performance, and ATOD use) over time.

The surveillance data collected by the state is anonymous at the individual level. Whereas anonymity may increase the validity of self-report for youth, it prevents us from being able to examine within-individual change. Nonetheless, the availability of repeated waves of data collection with the same schools and grade cohorts allowed us to examine the question, albeit with a diminished level of power.

Method

Procedure

The Pennsylvania Youth Survey (PAYS) was collected in 2001, 2003 and 2005 by the PA Commission on Crime and Delinquency (PCCD) through contracts with Channing Bete Corporation and Westat (for details, see Feinberg et al. 2007a). The survey was intended to serve a surveillance purpose, not for program evaluation purposes. For the 2001 survey, school grade-cohorts across Pennsylvania were selected for participation through a stratified random sampling procedure. The random sampling process was repeated in 2003 and 2005, although for those surveys additional schools could volunteer to participate in the survey in order to monitor risks and problems in their own community. To provide sufficient number of grade cohorts with longitudinal data, we utilize all available data regardless of random selection vs. volunteer school status. The PAYS datasets used in our analyses contained data from 125 schools in 91 school districts in 2001, 216 schools in 154 school districts in 2003, and 320 schools in 174 school districts in 2005.

As noted, it was not possible to track individual student scores over time due to the anonymous nature of the survey. Thus, our analyses concern changes in groups of individuals over time, rather than change within specific individuals. Our evaluation linked grade-cohorts of students within districts. For example, the 6^{th} graders responding to the 2001 PAYS were considered the same grade-cohort as the 8^{th} graders from the same school responding to the 2003 PAYS. This resulted in an analytic structure whereby subjects were nested within measurement periods which were nested within school district. In order to focus on change, we also restrict analyses to those cohorts in a school district for which outcomes were measured at least in two separate years. This restriction removed those cohorts in a district that were only measured at one time point, reducing the sample by roughly half. The final sample sizes are presented in Table 1, using the largest sample size at any measurement occasion for each cohort in each district.

The school districts in the combined 2001–2005 PAYS sample had an average of 7.2% of households below the

Table 1 Sample size and composition for analyses, by cohort

Cohorts 1 and 6 were not included in the assessment of change because data for these cohorts were only collected at one wave. The Expected-Impact sub-sample is a subset of the CTC sample.

Cohort:	2	3	4	5	Total
Grades surveyed	6, 8	6, 8, 10	8, 10, 12	10, 12	
Years surveyed	2003–05	2001–05	2001–05	2001–03	
CTC sample size	12,560	14,993	12,604	3,257	43,414
Expected-Impact sub-sample	4,936	7,168	4,267	1,466	17,837
Non-CTC sample size	3,649	6,757	4,853	602	15,861
Total sample size	16,209	21,750	17,457	3,859	59,275

poverty line (SD=3.8); and an average of 16.1% single-parent female-headed households (SD=7.2). Apart from two major metropolitan regions, Pennsylvania is largely composed of rural areas, and small towns and cities and is predominantly white. There was little participation in PAYS among the main school district in each of the two major metropolitan areas. The following figures reflect the resulting overall demographic profile: The average population of the school districts was 25,324 (SD=89,017). The average population density was 927.2 persons/sq. mile (SD=1,789.1). The average percentage for non-whites was 6.9 (SD=12.8), and the average percent age Hispanic was 2.5 (SD=6.0).

Measures

The student self-report measure utilized for the PAYS is the CTC Youth Survey, developed by the Seattle Social Development Research Group (Arthur et al. 2002) and the Channing Bete Company. The CTC Youth Survey assesses risk and protective factors for adolescent ATOD and delinquency and has been well-validated (Glaser et al. 2005; Hawkins et al. 2004). To examine program impact on key influences of adolescent behavior problems, we focus on seven risk and protective factor indices that have been shown to be strongly related to delinquency and substance use outcomes (Feinberg et al. 2007b). We created the indices based on theory and psychometric analyses of the 32 risk and protective factor scales in the CTC Youth Survey in order to reduce the number of analyses required, as well as to facilitate streamlined community decision making (Feinberg et al. 2007b). Each of these indices is comprised of several risk and/or protective factor scales from the CTC Youth Survey, collectively representing key influences on problem behaviors: Community Cohesion (comprised of the following scales: neighborhood attachment, community rewards for prosocial involvement, community disorganization), Perceived Availability of Drugs & Firearms (perceived availability of drugs and firearms, laws and norms related to drug use and firearms), School Prosocial Support (school opportunities for prosocial involvement, school rewards for prosocial involvement, low school commitment), Family Cohesion (family attachment, family opportunities for prosocial involvement, family rewards for prosocial involvement, family supervision, family discipline), Family Risk (parental attitude toward ATOD use, parental attitude toward antisocial behavior, family history of antisocial behavior), Antisocial Attitudes/Behaviors (perceived risks of drug use [reversed], attitudes toward antisocial behavior, attitudes toward ATOD use, belief in an immoral order, rebelliousness, sensation seeking, attitudes toward ATOD use), and Antisocial Peers (friends' delinquent behavior, friends' use of drugs, gang involvement, peer rewards for antisocial behavior). More information on the psychometrics of each scale and index are available elsewhere (Feinberg et al. 2007b).

Sample sizes for Family Cohesion and Family Risk analyses were about half of the sample because about half the schools declined to include those scales in the survey. Note that for Antisocial Attitudes/Behaviors, Family Risk, and Antisocial Peers, negative values indicate more healthy scores. Two of the indices were non-normally distributed and required re-scaling: Family Risk and Antisocial Peers were converted to four-level and three-level ordinal scales, respectively. We also included a single item as a measure of academic performance, which asked individuals to indicate their typical grades in the last year (ranging from A's to F's). The Academic Grades score was also converted to an ordinal value (1=C's or lower, 2=B's, and 3=A's).

To assess ATOD, we utilized three survey measures assessing cigarette, alcohol and marijuana use in the past 30 days. Because reported cigarette and marijuana use was very low (86% and 90% of the sample reporting no use, respectively), we converted these scales into dichotomous measures of use in the past 30 days. We assessed alcohol use both in terms of whether alcohol had been used in the past 30 days (dichotomous), as well as level of use in the past 30 days: 0 occasions, 1–2 occasions, 3 or more occasions. Students also indicated the number of times they were either drunk or high on drugs at school in the past year, from which we created a dichotomous use variable (91% indicated no such occasions).

Delinquency was assessed by the self-report of number of delinquent acts committed in the past year across the following categories: school suspensions, selling illegal drugs, vehicle theft, arrests, attacking to hurt, drunk or high

at school. Since the distribution of this scale was non-normal with a mode at zero, we created an ordinal version for statistical models where responses were re-coded into the following levels of delinquency: none, some, and high (top 10 percentile).

As in our previous cross-sectional analysis of CTC impact (Feinberg et al. 2007a), we examined CTC status in two ways. First, we compared responses from students in CTC communities to communities without a CTC coalition. However, CTC coalitions frequently implemented programs that did not target the students in the grades responding to the survey. For example, some CTC coalitions implemented programs for mothers and infants; as such, we did not expect impact on current middle and high school students. Moreover, programs may have targeted a small group of high-risk youth. A program may have been conducted for only one year, but not the next, and thus only students who received the program would have benefited. Further, we expected the most impact from CTC where EBPs were employed. Thus, in a second set of analyses, we defined the intervention sample as only those grade cohorts in CTC communities that were exposed to universal EBPs. To establish this distinction, we gathered annual data from each CTC site about which programs they implemented, age groups or grades that participated, and dates of implementation. We then determined whether each program named was on the former SAMHSA list of effective or model programs (http://modelprograms.samhsa.gov/model.htm). Programs that were on either list were coded as evidence-based . We then coded whether each grade cohort at each school was exposed to an evidence-based program on an annual basis. If a grade cohort was ever so exposed, we coded that grade cohort as having a potential impact by a universal EBP. Thus, the variable Expected-Impact was coded 1 for the grade cohorts exposed to a CTC-sponsored, universal EBP at any point; all other grade cohorts (i.e., combining non-CTC and non-expected impact CTC grade cohorts) were coded as 0.

Plan for Analyses

We employed 3-level hierarchical models to accommodate the subject-measurement wave-school district data structure. As indicated, our evaluation is based on how cohorts of students change within district and whether that change varies by program status. Because we wished to focus on within-cohort change over time, and given that school districts differed in the number of students surveyed within grade-cohorts as well as which grades were surveyed in each measurement wave, it was necessary to group-center the grade variable within cohort/district. The mean grade surveyed within cohort-districts was also included in analytic models as a control variable since the average age of those participating varied across districts. Other model covariates included a district-level poverty index (representing the percent age of families in the district below poverty level), gender, and cohort (12^{th} grade students in 2001 were considered cohort 1; 10th graders in 2001 were cohort 2; and so on through 4th graders in 2001, who did not respond to the PAYS until they were 6th graders in 2005, and were considered cohort 6). Main effect of CTC (1 = CTC, 0 = non-CTC) was included as well as the interaction between grade and CTC to represent the difference in change across grades between CTC and non-CTC communities for each outcome.

Separate models were estimated for each of the risk factors and substance use outcomes. For most risk/protective factor models, we used SAS Proc Mixed to analyze multi-level linear regression models. For the four rescaled measures (Family Risk, Antisocial Peers, Academic Grades and Delinquency) and the level of alcohol use outcome, we employed generalized linear mixed models using Stata's GLLAMM procedure specifying an ordinal logit function. To analyze the dichotomous substance use outcomes as well as the indicator for drunk/high at school, we used the same model estimation procedure with a logistic function. Because exploration of means indicated a steady increase or decrease of outcomes across grades for all these outcomes, our analyses modeled change in terms of linear change across grades.

Results

Both risk factor scores and substance use increased with age, whereas protective factor scores and academic grades decreased. Regression models indicated that this change was significant for all outcomes (coefficients for grade were at least $p<.001$). Table 2 provides the model-adjusted means by grade and group (comparison, overall CTC and Expected-Impact CTC), demonstrating overall change across years. Table 3 shows the results of the grade x CTC and grade x Expected-Impact CTC interaction terms, which represent the differences in change across intervention and comparison communities. The grade x CTC coefficients reflect the degree to which within-cohort change across grade levels in CTC communities differed from within-cohort change in other communities. Similarly, the grade x Expected-Impact interaction coefficients represent differences in within-cohort change between and other cohorts.

As shown in Table 3, regression models indicated no significant differences between CTC and non-CTC communities' grade cohorts in change of risk/protective factors, academic grades, and substance use. A significant difference in change between groups was found for delinquency ($p<.05$), with model results indicating a lower likelihood for youth in CTC communities, compared to non-CTC

Table 2 Conditional (model adjusted) means by group status and grade

				Grade			
Risk and Protective factors	Type	Range	Grouping	6th	8th	10th	12th
Community cohesion	Cont.	−2.5–1.8	Comp.	0.35	0.09	−0.16	−0.43
			CTC	0.36	0.11	−0.15	−0.41
			Exp.Imp.	0.34	0.09	−0.15	−0.40
Community drug-firearms	Cont.	−2.0–1.9	Comp.	0.57	0.17	−0.23	−0.64
			CTC	0.55	0.16	−0.24	−0.64
			Exp.Imp.	0.53	0.14	−0.24	−0.63
School prosocial	Cont.	−3.0–2.0	Comp.	0.20	0.04	−0.12	−0.30
			CTC	0.23	0.05	−0.11	−0.30
			Exp.Imp.	0.18	0.03	−0.11	−0.27
Family cohesion	Cont.	−2.2–3.3	Comp.	0.25	0.03	−0.19	−0.41
			CTC	0.30	0.08	−0.14	−0.37
			Exp.Imp.	0.27	0.06	−0.15	−0.36
Family risk	Ord.	1–4	Comp.	1.68	2.06	2.45	2.84
			CTC	1.70	2.07	2.44	2.82
			Exp.Imp.	1.69	2.05	2.42	2.78
Antisocial att./behavior	Cont.	−2.0–3.5	Comp.	−0.34	−0.10	0.15	0.39
			CTC	−0.35	−0.10	0.15	0.40
			Exp.Imp.	−0.34	−0.11	0.14	0.38
Antisocial peer	Ord.	1–3	Comp.	1.61	1.90	2.20	2.50
			CTC	1.58	1.88	2.17	2.47
			Exp.Imp.	1.63	1.90	2.17	2.44
Academic performance and antisocial behavior							
Grades last year	Ord.	1–3	Comp.	2.23	2.17	2.12	2.07
			CTC	2.27	2.21	2.15	2.10
			Exp.Imp.	2.24	2.20	2.15	2.12
Delinquency	Ord.	0–2	Comp.	0.20	0.29	0.38	0.47
			CTC	0.16	0.25	0.33	0.42
			Exp.Imp.	0.18	0.26	0.34	0.42
Substance use—past 30 days							
Alcohol use vs. no use	Dict.	0–1	Comp.	0.03	0.18	0.33	0.48
			CTC	0.04	0.19	0.35	0.52
			Exp.Imp.	0.04	0.19	0.35	0.51
Alcohol level of use	Ord.	0–6	Comp.	0.06	0.30	0.69	1.09
			CTC	0.06	0.30	0.71	1.04
			Exp.Imp.	0.05	0.27	0.70	1.01
Cigarette use vs. no use	Dict.	0–1	Comp.	0.02	0.10	0.18	0.27
			CTC	0.02	0.10	0.20	0.29
			Exp.Imp.	0.02	0.10	0.20	0.28
Marijuana use vs. no use	Dict.	0–1	Comp.	0.00	0.07	0.13	0.19
			CTC	0.00	0.06	0.12	0.19
			Exp.Imp.	0.00	0.06	0.12	0.19
Drunk/high at school (past yr)	Dict.	0–1	Comp.	0.01	0.06	0.13	0.19
			CTC	0.01	0.06	0.14	0.18
			Exp.Imp.	0.01	0.05	0.13	0.17

Notes: Cont. = Continuous, Ord. = Ordinal, Dict. = Dichotomous. Grouping: Comp. = Comparison group; CTC = overall CTC; Exp. Imp. = Expected-Impact CTC (subset of overall CTC)

communities, to increase in level of antisocial behavior over time.

Several significant differences were found, however, in models contrasting Expected-Impact CTC grade-cohorts and comparison grade-cohorts (i.e., non-CTC grade cohorts and all other CTC grade cohorts). Results showed consistent significant and beneficial intervention effects for risk/protective factors, academic grades, and delinquency. These

Table 3 Effects of CTC and Expected-Impact CTC on change in risk/protection and substance use

	Grade x CTC			Grade x Expected-Impact		
	Model	Coeff.	p-value	Coeff.	p-value	ES
Risk and protective factor indices						
Community cohesion	R	.0050	0.477	.0142*	0.029	.12
Community drug-firearms	R	.0050	0.477	.0144*	0.031	.09
School prosocial	R	−.0020	0.854	.0388*	0.000	.35
Family cohesion	R	.0035	0.787	.0211*	0.026	.16
Family risk	O	.0131	0.181	−.0850*	0.001	.18
Antisocial attitudes/behavior	R	.0044	0.624	−.0217*	0.009	.17
Antisocial peer	O	−.0177	0.448	−.1117*	0.000	.27
Academic performance and antisocial behavior						
Grades last year	O	.0033	0.856	.0588*	0.001	.32
Delinquency	O	−.0430*	0.049	−.0621*	0.007	.19
Substance use—past 30 days						
Alcohol: use vs. no use	L	.0257	0.331	−.0211	0.432	–
Alcohol: level of use	O	.0303	0.255	−.0251	0.343	–
Cigarette:use vs. no use	L	.0277	0.300	−.0075	0.777	–
Marijuana: use vs. no use	L	.0027	0.935	.0028	0.283	–
Drunk/high at school (past yr)	L	−.0133	0.704	.0274	0.446	–

Notes: R = linear; O = ordinal; L = logistic models. ES = Effect size. *$p<.05$. CTC x Grade indicates the Program x time interaction term. Expected-Impact x Grade represents a similar interaction term, but compares change for Expected-Impact CTC grade-cohorts to all other grade cohorts. Expected-Impact CTC is a subset of CTC (see text).

analyses suggest that the decline of protective factors and increase in risk factors, which we observe for the entire sample, is less steep over time for Expected-Impact grade-cohorts compared to other grade-cohorts. From ordinal models assessing risk factors (Antisocial Peers and Family Risk), results showed a significantly lower likelihood for youth in Expected-Impact grade cohorts to move to higher levels of risk as they get older. Similarly, the significant interaction in the separate ordinal models assessing the effect of Expected-Impact CTC on grades and antisocial behavior demonstrated that youth in those grade-cohorts reported less decline in academic performance and less increase in delinquency than youth in comparison communities. In contrast to these consistent effects found for risk/protective factor scores, grades, and delinquency, results did not indicate any statistically significant differences in substance use behaviors in analyses comparing Expected-Impact CTC vs. comparison grade cohorts.

For the significant results, effect sizes (Cohen's *d*) were calculated from the group differences in the change between groups from grade 6 through grade 12, using model-derived adjusted means (Table 3). While interpretation of effect sizes should acknowledge the substantive context of the outcomes, indices indicate small to moderate effects. Larger group differences in change were found from models on Academic Grades ($d=.32$), School Prosocial Support ($d=.35$), and Antisocial Peers ($d=.27$). In contrast, smaller effects were found for group differences in change for Community Cohesion ($d=.12$) and Perceived Availability of Drugs & Firearms ($d=.09$). Effect sizes for Delinquency and the other risk/protective indices—Family Cohesion, Family Risk, Antisocial Attitudes/Behavior—showed small effect sizes as well (in the .15–.20 range).

Finally, Table 4 provides some perspective on normative change across age/grade using figures derived from the multilevel model predicted means. The left and center columns provide information on normative change, based on the average values for the youngest grade surveyed across cohort-districts (left column), and the per-year expected rate of change in the comparison districts (center column). The right column of Table 4 shows the percent age reduction in normative annual change associated with Expected-Impact CTC. Models indicate that the normative decline in protective factors was reduced for youth at Expected-Impact CTC schools, ranging from 3% (Drug-Firearms Availability) to 16% (School Prosocial) less annual decline in protection. For Academic Grades, models indicated approximately one-third less annual decline in level of academic performance for youth exposed to evidence-based CTC programs. Finally, results show that the normative increase in delinquent behavior was reduced by 11% annually for Expected-Impact CTC grade-cohorts compared to all other grade-cohorts.

Discussion

This paper presents evidence that community prevention coalitions can have a population-level impact. Moreover, this evidence comes from a naturally occurring dissemination of a coalition model, rather than from a researcher-initiated trial or demonstration project. These results

Table 4 Percent age reduction in normative change due to Expected-Impact CTC status

	Average score at 6th grade, comparison districts	Annual change, comparison districts	% reduction in change due to Expected-Impact CTC status
Community cohesion	.36	−.14	4.6
Availability of drug-firearms	.56	−.20	3.0
School prosocial support	.22	−.12	16.4
Family cohesion	.29	−.12	7.7
Antisocial attitudes/behavior	−.36	.12	6.7
Family risk	1.67	.37	6.7
Antisocial peers	1.59	.40	10.8
Academic grades	2.25	−.09	33.2
Delinquency	0.18	.21	10.8

indicate that the presence of CTC in a community was associated with decreased growth in delinquency across adolescence. However, the implementation of universal EBPs targeting adolescents by a CTC coalition resulted in stronger effects on delinquency as well as population-level impact on a range of risk/protective factors and on academic performance. There was no evidence, however, for impact on substance use.

The pattern of results reported here is consistent with our earlier cross-sectional findings (Feinberg et al. 2007a) in which stronger and more consistent effects of CTC were found when we focused on grade cohorts exposed to universal EBPs. Our previous findings were open to the criticism that self-selection of communities into CTC may have biased results. Here, we utilized longitudinal data and tested for impact on change. This design to a large extent removes the possibility that selection bias is responsible for the findings. Although this study is not a randomized control trial, we consider the results to be robust, as each community is essentially serving as its own control in the within-community, within grade-cohort change design.

The effect sizes for risk and protective factors in this study ranged from small to moderate. Relatively large effects were found for the prosocial school index (school opportunities and rewards for prosocial involvement, school commitment), which may result from the fact that the majority of universal, adolescent programs are implemented through schools. On the other hand, small effects were seen for risk and protective factors that were not likely targeted by the prevention programs employed—for example, availability of drugs and firearms in the community and community cohesion. Thus, the pattern of effect sizes is consistent with the focus of the prevention programs implemented in CTC communities. In addition, because the focus of this research is on how these outcomes change across high school ages, it is also important to consider the degree to which normative change may be increased or reduced due to program efforts. For instance, model results indicate that the typical decrease in (self-reported) academic grades from grade 6 through grade 12 was lessened by over 30% for Expected-Impact grade cohorts.

The findings are consistent with the results from an ongoing randomized trial of CTC, which is finding positive initial impact of CTC on risk factors for ATOD and on delinquency (Hawkins et al. 2007). The value of the current study lies in the examination of a natural dissemination process involving over 120 CTC communities. Unlike most randomized trial efficacy trials, this effectiveness study did not involve high levels of researcher involvement and oversight in program implementation. The positive findings reported here indicate that CTC is not only efficacious, but is effective under "real world" conditions—especially when universal, evidence-based programs target adolescents (Woolf and Johnson 2005).

In contrast to the findings for risk and protective factors, academic performance and delinquent behavior, there was no discernible impact of CTC on youth-reported substance use. The design of this study was conservative in several respects, as we outline below. A less conservative design may have demonstrated stronger impact on risk/protective factors and significant findings for substance use outcomes. As further waves of data become available, we will revisit these analyses.

These findings are likely to be conservative for two reasons related to the fact that we could not link individual responses over time. First, we could not identify adolescents who had recently moved into CTC communities and thus would not have been affected by programs implemented in prior years. Inclusion of these newcomers in analyses dilutes the magnitude of program effects. Second, as individual responses could not be linked over time, the error variance in the models was somewhat inflated, which leads to conservative p values.

Another conservative aspect of the design is that the overall test of PAYS data comparing CTC vs. non-CTC communities does not take into account the full effects of

CTC programs on communities. For example, some sites initiated home visiting programs for mothers of young children that would not be expected to affect current middle and high school students. In addition, this omnibus evaluation included risk factors and outcomes not necessarily targeted by the particular programs implemented in many communities. For example, a particular family program might be geared towards changing parental attitudes and behaviors; assessing effects on all the other risk factors in PAYS may be considered unwarranted as the program was not designed to alter those risks.

Finally, this study compares communities that use CTC to communities that provide other prevention services. CTC is one of many approaches that communities are taking to address adolescent risk and problem behavior. Many schools in the non-CTC sites are delivering programming to reduce initiation and use of alcohol, tobacco, and illegal substances as mandated by the Safe and Drug Free Schools section of the No Child Left Behind Act. Thus, analyses do not compare CTC against no prevention activity, but against "business as usual" in Pennsylvania communities.

An important limitation of this research is the limited participation in the PAYS survey by schools in the two large urban areas of PA. Although smaller cities participated, the results cannot be generalized to large urban settings in which social, economic, or institutional conditions might limit the effectiveness of either specific EBPs or the coalition model. Our reliance on self-report data is another limitation. Ideally, research on important issues such as delinquency and ATOD would triangulate on outcomes by also incorporating archival data not susceptible to self-report bias, such as numbers of school disciplinary infractions, emergency room visits, and arrests (some of which have other potential biases). In addition, there are threats to study validity due to the fact that the design is not a randomized trial (Shadish et al. 2002). Most importantly, omitted variables might possibly account for outcomes.

The evidence of CTC impact on adolescent risk and protective factors, delinquency, and academic performance reported in this paper provides support for the importance of three key elements of CTC and other effective community coalition models (e.g., PROSPER): utilization of evidence-based programs, a focus on implementation fidelity, and provision of adequate technical assistance support to the coalitions (see Hallfors et al. 2002; Woolf and Johnson 2005). When these elements are in place, community collaboratives can make a substantial contribution toward addressing public health problems.

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