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EVALUATION REPORT:

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

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EXECUTIVE SUMMARY

Objectives. We examined whether the Communities That Care (CTC; (Hawkins & Catalano, 1992)) model reduced growth in risk and substance use among adolescents in a quasi-experimental effectiveness study.

Methods. We conducted a longitudinal evaluation of CTC in Pennsylvania utilizing biannual surveillance data collected through anonymous in-school student surveys (the Pennsylvania Youth Survey; PAYS) from 2001 through 2005. We utilized multilevel models to examine CTC impact on *change* in risk factors and substance use over time.

Findings. Risk and problem behaviors typically increase across adolescence; this pattern was found for youth in both CTC and non-CTC communities. However, compared to others, grade cohorts of youth in CTC communities who were exposed to evidence-based, universal prevention programs demonstrated:

- 11% lower yearly growth in delinquency
- 33% lower yearly decline in academic performance
- Lower yearly growth in risk factors associated with substance use and delinquency
- Lower yearly decline in protective factors associated with substance use and delinquency

Conclusion. These findings indicate that CTC can affect adolescent risk and protective behaviors at a population level when evidence-based programs are utilized.

INTRODUCTION

The United States' "War on Drugs" consists of ineffective supply reduction efforts that include border interdiction and the disruption of farming and distribution chains in foreign counties, and underfunded domestic demand reduction efforts that include prevention and treatment ((Carnevale, 2008; Perl, 2006)). For communities interested in a public health approach to the prevention of alcohol, tobacco and other drugs (ATOD) use, few evidence-based models of broad community-level planning and action have demonstrated effectiveness. Although numerous evidence-based prevention (EBP) programs have been developed ((R. L. Spoth, Greenberg, M. T., & Turrisi, R., 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 U.S. 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.

Communities That Care has been shown to provide an efficacious and systematic model for communities facilitating coordinated planning and implementation of EBPs. The Pennsylvania State University's Prevention Research Center for the Promotion of

Human Development (PRC) has been evaluating Pennsylvania's roll-out of Communities That Care (CTC), which began in the mid-1990s and has since reached more than 120 communities. CTC involves the formation of collaborative community partnerships among community stakeholders to spearhead adoption and support of EBPs targeting risk factors for adolescents. CTC focuses on a wide range of risk and protective factors to reduce adolescent problem behavior, 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 on a randomized trial ((Hawkins et al., 2007)). However, this 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)).

The systematic dissemination of CTC by the Pennsylvania Commission on Crime and Delinquency provides a long-term opportunity to understand CTC under real-world conditions. In the course of evaluating this initiative, we have previously described and modeled coalition processes and supports, including readiness, coalition functioning (e.g., leadership, member involvement, cohesion), training and technical assistance, and sustainability ((M.E. Feinberg, Bontempo, & Greenberg, 2008; M.E. Feinberg, Mark T. Greenberg, & D.W. Osgood, 2004; Mark E. Feinberg, Mark T. Greenberg, & D. Wayne Osgood, 2004; Mark E. Feinberg, Greenberg, Osgood, Anderson, & Babinski, 2002)). We

recently reported a quasi-experimental study of the effectiveness of CTC that involved a comparison of student reports on risk factors and problem behaviors across CTC and non-CTC communities ((M. E. Feinberg, Greenberg, Osgood, Sartorius, & Bontempo, 2007)). Analyses of data from Pennsylvania's youth behavior surveillance survey revealed 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. This finding emerged in contrast to a number of prior reports showing that other community coalitions showed few positive effects ((Hallfors, Hyunsan, Livert, & Kadushin, 2002; Klerman, Santelli, & Klein, 2005; Roussos & Fawcett, 2000)). The evidence of CTC effectiveness—as well as evidence regarding PROSPER, another community-based dissemination model ((R. L. Spoth et al., 2007))—suggests that effectiveness may require three elements: utilization of EBPs, sufficient technical assistance support, and fidelity of implementation (see (Hallfors, Hyunsan, Livert, & Kadushin, 2002)).

A drawback of the Pennsylvania study was its quasi-experimental nature: communities were not randomly assigned to condition, but rather self-selected into participation in the Commonwealth's CTC training and support program. Our methodological and statistical efforts to detect and control for differences between CTC

and non-CTC communities were not able to fully account for this self-selection bias. (One strong argument against the threat to validity posed by self-selection bias was that results proved much stronger when analyses compared CTC community grade cohorts that were targeted by universal EBPs to all other grade cohorts.)

Even though the finding of CTC effectiveness in that cross-sectional study was promising, a stronger test of effectiveness under real-world conditions would be to examine *change* in youth risk and outcomes over time. That is, if we controlled for risk or problem behaviors at an earlier time point, would CTC activity lead to declines in risk factors and problem behaviors over time within the same communities? The use of longitudinal data to test CTC effectiveness provides a stronger test than the prior cross-sectional design.

The surveillance data collected by the state in PAYS 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 change at the level of individual students. However, the availability of repeated waves of data collection for the same schools and same grade cohorts allowed us to examine the question of change with the unit of analysis as a grade-cohort in a particular school district. The tracking of grade-cohorts rather than individual students reduced the level of power to detect effects.

EVALUATION METHODS

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. The sample consisted of students in schools that participated as part of a biannual stratified random sampling of Pennsylvania schools (for details, see (M. E. Feinberg, Greenberg, Osgood, Sartorius, & Bontempo, 2007)), as well as students in schools that volunteered to participate in the survey. (Limiting the sample only to schools in the random sample would have decreased the study's power to detect effects.) The stratified random sampling procedure yielded 43,842 respondents in 2001; 38,845 respondents in 2003; and 14,313 in 2005. In 2003 and 2005, additional schools volunteered to participate in the survey in order to monitor risks and problems in their own communities. Among both the randomly sampled and volunteer school districts, some of the school districts were associated with CTC sites funded by the PCCD. The available full data sets contained data on 91 school districts and 43,842 students in 2001, and 154 school districts and 101,988 students in 2003, and 174 school districts and 90,479 students in 2005. Table 1 provides the sample sizes for analyses broken down by grade and program status (missing data occurred at a rate of 2%, which was considered negligible).

As noted, it was not possible to track individual student scores over time due to

the anonymous nature of the survey. Instead, our longitudinal analyses linked grade-cohorts from a particular school. For example, the 6th graders responding to the 2001 PAYS were considered the same grade-cohort as the 8th graders from the same school responding to the 2003 PAYS. Thus, our analyses concern changes in population rates over time, rather than change in specific individuals.

Table 1

Sample size for analyses, by cohort

Cohort (Grades surveyed)	2 (6,8)	3 (6,8,10)	4 (8,10,12)	5 (10,12)	Total
CTC sub-sample	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 sub-sample	3,649	6,757	4,853	602	15,861
Total Sample	16,209	21,750	17,457	3,859	59,275

NOTE: Cohorts 1 and 6 were not included in the analyses since data for these cohorts were only collected at one wave.

The school districts in the combined 2001–2005 PAYS sample had an average of 7.2% of households below the poverty line (range 1.0–23.0); and an average of 16.1% single-parent female-headed households (range 5.0–54.7). 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 this fact and offer an overall demographic profile: The average population of the school districts was 25,324 (range 2,420–1,419,975). The average population density was 927.2 persons/sq. mile (range 15.0–11233.6). Although many of the school districts in the rural and small town areas were predominantly white, some small cities had predominant minority populations. The average percentage of non-whites was 6.9 (range 0%–90%), and the average percent Hispanic was 2.5 (range 0%–52%). Note that these figures were calculated based on averages across school districts; a weighted average based on the population of each school district would have indicated higher levels of population density and non-white residents.

Measures

The student self-report measure utilized for the PAYS is the CTC Youth Survey, developed by the Seattle Social Development Group ((Arthur, Hawkins, Pollard, Catalano, & Baglioni, 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, Van Horn, Arthur, Hawkins, & Catalano, 2005; Hawkins, Van Horn, & Arthur, 2004)). To examine program impact on key risk and protective factors for adolescent behavior problems, we focus on eight risk and protective factor indices created from the 32 original risk and protective factor scales. These indices have been shown to be strongly related to antisocial behavior and substance use outcomes ((M.E. Feinberg, Ridenour, & Greenberg, In press)): Community Cohesion, School Prosocial

Support, Family Cohesion, Family Risk, Antisocial Attitudes, Antisocial Behaviors, Perceived Availability of Drugs & Firearms, and Antisocial Peers. Note that for Antisocial Attitudes, Antisocial Behaviors, Family Risk and Antisocial Peers, negative values indicate more healthy scores. Two of the risk-factor scales were non-normally distributed and required re-scaling: Family Risk and Antisocial Peer were converted to four-level and three-level ordinal scales, respectively. Sample sizes for Family Cohesion and Risk analyses were about half of the sample because about half of the schools declined to include those scales in the survey.

To assess ATOD, we utilized three items assessing the extent of cigarette, alcohol and marijuana use in the past 30 days. Respondents indicated their alcohol and marijuana use in terms of a 7-item scale: 0 occasions, 1–2 occasions, 3–5 occasions, 6–9 occasions, 10–19 occasions, 20–39 occasions, 40 or more occasions. The extent of cigarette use was surveyed in terms of no use, less than 1 cigarette per day, 1–5 per day, half-pack per day, one pack per day, 1.5 packs per day, 2 or more packs per day. These three items were also converted to dichotomous variables representing use vs. no-use. A fourth dichotomous variable was created from an item in the survey measuring the number of times the student had been either drunk or high on drugs at school in the past year.

As in our previous cross-sectional analysis of CTC impact ((M. E. Feinberg, Greenberg, Osgood, Sartorius, & Bontempo, 2007)), 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; we did not expect to see immediate impact on middle and high school students in those communities. Moreover, programs may have targeted a small group of high-risk youth for intensive intervention (e.g., students in drug treatment or on juvenile probation). Or a program may have been conducted for only one year, but not the next, and thus only students who received the program would have been affected by it. 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 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 each grade cohort at each school as impacted or not impacted by a universal EBP.

Analyses

We employed 3-level hierarchical models to capture subjects nested within measurement period nested within school district. As indicated, the number of

individuals surveyed within grade varied across measurement years within district. Therefore, grade was centered within measurement period and district to compensate for this imbalance in the design. Model covariates included a district-level poverty index (representing the percentage of families in the district below poverty level), gender, grade, and cohort. (12^{th}-grade students in 2001 were considered cohort 1; 10^{th} graders in 2001 were cohort 2; and so on through 4^{th} graders in 2001, who did not respond to the PAYS until they were 6^{th} 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. For expected impact analyses, the variable for expected impact was coded as: 1=expected CTC program impact, 0=all other grade cohorts (i.e., combining non-CTC and non-expected impact CTC grade cohorts).

Separate models were executed for each of the risk factors and substance use outcomes. To analyze the level of substance use, 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 whether drunk/high at school, we used the same model estimation procedure with a logistic function. For most risk factor models, we used SAS Proc Mixed to run multi-level linear regression models. For the two rescaled risk factors (Family Risk, Antisocial Behavior), we used the ordinal logit model described above.

FINDINGS

Although we do not depict the main effect of grade (i.e., time), as expected risk factor scores and substance use increased and protective factor scores decreased from 6th to 12th grades ($p<.001$ for all models). Table 2 shows the results of the grade x CTC and grade x Expected Impact interaction terms, which represent the differences in change across intervention and control communities. These coefficients reflect the degree to which within-cohort change across grades in CTC communities (or Expected Impact cohorts) differed from within-cohort change in other communities (or cohorts). A significant difference in change between CTC and non-CTC communities was found for delinquency ($p<.05$). Results indicated a lower likelihood for youth in CTC communities, compared to non-CTC communities, to increase in level of anti-social behavior over time. There were no significant differences between CTC and non-CTC communities' grade cohorts in change in risk/protective factors, academic grades, and substance use.

Results for CTC expected-impact grade-cohorts vs. all other grade cohorts demonstrate significant and beneficial intervention effects for delinquency, academic grades and all risk/protective factors but not substance use. Results indicate that the decline in protective factors and increase in risk factors is less steep over time for expected-impact grade-cohorts compared to other grade-cohorts. For models assessing ordinal risk factors (e.g., Antisocial Peers and Family Risk), results indicate a significantly lower likelihood for youth in expected-impact grade cohorts to move to higher levels of

risk.

Table 2

Effects of CTC and Expected-impact CTC on change in risk/protection and substance use

		CTC x Grade		Expected-impact x Grade	
	Model	Coeff.	p-value	Coeff.	p-value
Risk and Protective Factor Indices					
Community Cohesion	R	.0050	0.477	.0142*	0.029
Community Drug-Firearms	R	.0050	0.477	.0144*	0.031
School Prosocial Support	R	-.0020	0.854	.0388*	0.000
Family Cohesion	R	.0035	0.787	.0211*	0.026
Family Risk	O	.0131	0.181	-.0850*	0.001
Antisocial Attitudes/Behavior	R	.0044	0.624	-.0217*	0.009
Antisocial Peer	O	-.0177	0.448	-.1117*	0.000
Academic Performance and Antisocial Behavior					
Grades Last Year	O	.0033	0.856	.0588*	0.001
Delinquency	O	-.0430*	0.049	-.0621*	0.007
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: Model: R=linear; O=ordinal; L=logistic models. *Statistically significant (p<.05). CTC x Grade indicates the program x time interaction term testing for differential change over time. Expected-impact x Grade represents a similar interaction term, but compares change for Expected-impact CTC grade-cohorts to all other grade cohorts.

A useful measure of the magnitude of effect on outcomes is the percent of reduced use attributable to condition. Table 3 provides effect sizes for the effect of expected-impact status on risk and protective factors, delinquency, and academic grades. The table includes the average values for the youngest grade surveyed (beginning of measurement) across cohort-districts (left column), as well as the per-year expected rate of change in the comparison districts (center column). The right column of Table 3 provides the percent reduction in normative annual change across grades associated with expected-impact CTC. The largest effects are found for academic grades, which decrease 33% less quickly among grade-cohorts exposed to EBPs in CTC communities. School prosocial support decreases 16% less quickly for youth in expected-impact CTC grade cohorts. In addition, growth in delinquency and antisocial peers is 11% slower among youth in expected-impact CTC grade cohorts.

Table 3

Percent 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
Community 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

CONCLUSIONS

This paper presents the strongest evidence to date that community prevention coalitions targeting risky adolescent behavior can have a population-level impact. The results did not indicate that the mere existence of a CTC process in a community had a positive effect on youth. Instead, the implementation of universal EBPs targeting adolescents by a CTC coalition appears to be necessary to demonstrate substantial population-level impact on levels of adolescent outcomes.

These results should not be taken to suggest that implementing other types of programs—for example, early childhood programs or programs targeting high-risk adolescents—are not effective or should not be used by CTC or other coalitions. First, this study was not designed to detect effects of programs targeting young children. Second, programs targeting "selected" or "indicated" high-risk groups may substantially reduce levels of problem behavior among targeted high-risk adolescents; however, the effects of such programs on a subset of the population are likely to be diluted when an entire population is studied.

Given the current evaluation design, it was necessary to limit the intervention sample to those grade cohorts that had been targeted by universal, evidence-based programs in order to fully assess the impact of CTC. The pattern of results reported here is consistent with our earlier cross-sectional findings ((M. E. Feinberg, Greenberg, Osgood, Sartorius, & Bontempo, 2007)) in which stronger and more consistent effects were found when we limited the intervention sample to grade cohorts where there was an expectation of substantial impact.

The consistency of the results for the "expected impact" grade cohorts were striking. Significant impact was demonstrated on each of the risk and protective factors, delinquency, and academic grades. The percentage reduction in use by 12th grade due to universal EBPs implemented by CTC sites was substantial for academic grades, delinquency, school prosocial support, and antisocial peers.

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 CTC impact on change within grade-cohorts and within communities. This design to a large extent removes the possibility that selection bias is responsible for the findings. Although this study is not a randomized controlled trial, we consider the results to be robust.

The findings are consistent with the results from an ongoing randomized trial of CTC, which is finding a positive initial impact of CTC on risk factors for ATOD and on delinquency ((Hawkins et al., 2007)). In that trial, CTC communities are employing a combination of targeted and universal programs. The value of the current study lies in the examination of a 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—at least when universal, evidence-based programs target adolescents ((Woolf & Johnson, 2005)).

Importantly, we note that these findings are likely to be conservative as survey respondents were anonymous and thus we could not link individual responses over time. As a result, we could not identify adolescents who had recently moved into the community 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 individuals could not be studied over time, the error variance in the models was larger, which leads to conservative p values and effect sizes.

The study design is conservative in other ways as well. 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 middle and high school students. In addition, this omnibus evaluation included risk factors and outcomes not necessarily targeted by any particular program or that might not be prevalent at a certain age. For example, a particular family program might be geared towards changing parental attitudes and behaviors; assessing effects on all the other risk factors assessed by PAYS would be unwarranted as the program was not designed to alter those risks. In this manner, the effect documented by this evaluation was not tightly linked to the particular community-level goals and programs employed.

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 directed toward the outcomes of reducing 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 is the limited participation in the PAYS survey by schools in the two large urban areas of Pennsylvania. 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.

In conclusion, the substantial evidence of CTC effectiveness is consistent with other studies regarding necessary conditions for successful prevention program implementation. Evidence suggests that three essential elements facilitate population-level effects in community prevention efforts: (1) Utilization of evidence-based practices and programs, (2) Access to sufficient technical assistance support, and (3) A focus on program implementation fidelity (see (Hallfors, Hyunsan, Livert, & Kadushin, 2002); (Woolf & Johnson, 2005)). When these elements are in place, as they have been in Pennsylvania's dissemination of CTC, communities can achieve substantial population-level effects on adolescent risk, protection, and problem behavior.

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