Effects of the Communities That Care Prevention System on Youth Reports of Protective Factors

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Abstract

Many interventions seeking to reduce problem behaviors and promote healthy youth development target both risk and protective factors, yet few studies have examined the effect of preventive interventions on overall levels of protection community wide. In a community-randomized controlled trial, this study tested the effect of Communities That Care (CTC) on protective factors in 24 communities across 7 states. Data on protective factors were collected from a panel of 4,407 youths in CTC and control communities followed from Grade 5 through Grade 8. Hierarchical linear modeling compared mean levels of 15 protective factors derived from the social development model in CTC and control communities in Grade 8, adjusted for individual and community characteristics and baseline levels of protective factors in Grade 5. Global test statistics were calculated to examine effects on protection overall and by domain. Analyses across all protective factors found significantly higher levels of overall protection in CTC compared to control communities. Analyses by domain found significantly higher levels of protection in CTC than control communities in the community, school, and peer/individual domains, but not in the family domain. Significantly higher levels of opportunities for prosocial involvement in the community, recognition for prosocial involvement in school, interaction with prosocial peers, and social skills among CTC compared to control youth contributed to the overall and domain specific results. This is consistent with CTC's theory of change, which posits that strengthening protective factors is a mechanism through which CTC prevents behavior problems.

Keywords

Protective factors; Prevention; Community intervention; Communities That Care; Social development model; Social development strategy

In the past few decades, prevention scientists have made great progress in identifying risk factors that predict increased likelihood of adolescent problem behaviors such as delinquency or substance use (Fraser, Kirby, & Smokowski, 2003). For example, contextual and individual factors, including economic deprivation, neighborhood disorganization, high

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levels of family conflict, and rebelliousness put youth at risk for multiple problems (Arthur, Ayers, Graham, & Hawkins, 2003; Hawkins, Catalano, & Miller, 1992). Based on this knowledge, preventive interventions have been developed that successfully reduce risk factors and prevent problem behaviors (Farrington & Welsh, 2006; Fraser et al., 2003; Pollard, Hawkins, & Arthur, 1999).

However, the absence of risk does not indicate the presence of protection (Catalano, Hawkins, Berglund, Pollard, & Arthur, 2002). In recent years, researchers have shown increased interest in understanding the role of protective factors in youth development, and several studies have found that protective factors moderate the development of problem behaviors (Bowers et al., 2011; Hartman, Turner, Daigle, Exum, & Cullen, 2009; Hawkins, Catalano, & Miller, 1992; Lösel & Farrington, 2012; O'Donnell, Hawkins, & Abbott, 1995). Some preventive interventions have focused on enhancing protection as a mechanism both to prevent health and behavior problems and to promote positive youth outcomes (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Pollard et al., 1999). For example, the Big Brothers Big Sisters mentoring program improves social, behavioral, and emotional competence by strengthening prosocial bonding (Grossman & Tierney, 1998); and Promoting Alternative Thinking Strategies teaches social and emotional skills to improve appropriate expressions of feelings and reduce antisocial behavior (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004; Greenberg, Kusche, Cook, & Quamma, 1995). Findings from these studies indicate that factors such as social skills and positive relationships are important for preventing problem behaviors and promoting healthy development (Pittman, O'Brien, & Kimball, 1993, as cited in Catalano et al., 2002). Despite this growing knowledge that some factors in individuals and their social environments can prevent problem behaviors and promote positive behaviors, little research has examined the effect of preventive interventions on enhancing such factors themselves.

This study uses the social development model (SDM; Catalano & Hawkins, 1996; Hawkins, Catalano, & Miller, 1992; Hawkins & Weis, 1985) to identify a set of factors hypothesized to promote positive behaviors and protect against the development of problem behaviors. We call these protective factors here, though we recognize differences among scholars in the use of this term (Rutter, 1987; Sameroff, 2006; White, Moffitt, & Silva, 1989).

Social Development Model

The SDM is a theory that integrates elements from social control theory (Hirschi, 1969), social learning theory (Akers, 1977), and differential association theory (Sutherland, 1973) to explain the development of prosocial and antisocial behaviors across multiple socializing units over time (Catalano & Hawkins, 1996). The theory asserts that the social development process is the result of opportunities, skills, and recognition or reward in different social contexts. These are, in turn, hypothesized to promote individuals' attachment and commitment, or bonding, to the individuals or groups who provide opportunities and recognition. Bonding to an individual or group is hypothesized to promote acceptance or adoption of the standards for behavior of that person or group, and in turn, lead to prosocial or antisocial behavior. Thus, the SDM posits two distinct pathways for prosocial and antisocial behaviors. The theory suggests that the opportunities, skills, and rewards for

antisocial involvement that lead to antisocial behaviors are theoretically distinct from opportunities, skills, and recognition for prosocial involvement that lead to prosocial behaviors. Previous research has validated the theoretical constructs as well as the developmental risk and protective processes of the SDM with diverse populations (Catalano, Oxford, Harachi, Abbott, & Haggerty, 1999; Fleming, Catalano, Oxford, & Harachi, 2002; Roosa et al., 2011; Sullivan & Hirschfield, 2011). This study seeks to understand whether the protective factors specified in the SDM, when consistently measured across multiple socializing units (i.e., community, school, family, peer, individual), can be affected by a community-based prevention strategy guided by the same theory.

Communities That Care

Communities That Care (CTC) is a prevention system that aims to reduce elevated risks, enhance protection, promote healthy youth development, and prevent adolescent behavior problems community wide (Hawkins, 1999; Hawkins, Catalano, & Arthur, 2002; Hawkins, Catalano, & and Associates, 1992). CTC is guided theoretically by the social development strategy, which is the prosocial pathway of the SDM. It seeks to prevent problem behaviors and promote positive development among youth by creating opportunities and recognition for prosocial involvement and interaction in youths' daily lives and ensuring that youths learn the skills needed to succeed in these involvements and interactions.

CTC activates a coalition of diverse stakeholders in the community and trains coalition members to collaborate and cooperate in selecting and implementing tested and effective prevention policies and programs in the community. The CTC system is expected to improve the community's prevention service system by increasing the adoption of a science-based approach to prevention and the use of tested and effective programs. These changes in the prevention service system are expected to reduce risks and strengthen protective factors among the community's youth and, in turn, to change youth behaviors. Coalitions in CTC communities are trained to assess levels of community risks using epidemiological data. Based on the assessment of the community-specific profile of risk, CTC communities are encouraged to target two to five elevated risk factors in the community using evidence-based policies and programs.

CTC coalitions are not required to target specific protective factors. Instead, they are trained in and encouraged to use the social development strategy (SDS) in their daily interactions with young people and to promote the use of this strategy throughout the community. Specifically, all community members are asked to 1) provide youth in their families, schools, and communities with developmentally appropriate opportunities to be actively involved in prosocial activities; 2) teach them skills to successfully be involved; and 3) provide consistent and specific recognition for their effort, improvement, and achievements. CTC materials include a PowerPoint presentation of the social development strategy which coalition members are encouraged to present to groups, organizations, and agencies in their community. Furthermore, the programs listed in the CTC prevention guide that address certain risk factors indicate corresponding protective factors the programs also address. For example, school behavior management interventions that address early and persistent antisocial behavior or rebelliousness also address healthy beliefs and clear standards and

opportunities and recognition for prosocial involvement. Because most prevention programs selected by CTC coalitions address both risk and protective factors and because coalition members are trained to use and promote the social development strategy in their community, we hypothesized CTC could increase overall levels of protective factors specified in the social development strategy. Another community prevention system, PROSPER (Redmond et al., 2009), has shown positive effects in a randomized trial in promoting protective factors specified by its developers. In that study, family environment, child management, parent-child affective quality, problem-solving skills, and assertiveness were higher among youth in intervention compared to control communities.

Prior analyses of data from the Community Youth Development Study (CYDS), a community-randomized trial of CTC, found that youth in a longitudinal panel from CTC communities reported significantly lower levels of community-targeted risk factors than their control community counterparts from when they were in seventh grade (Hawkins et al., 2008). CTC also was found to reduce the incidence of cigarette, smokeless tobacco, and alcohol use, and delinquent behaviors in the longitudinal panel by the end of eighth grade (Hawkins et al., 2009). The present analyses examined the extent to which CTC increased protective factors on the positive pathway of the social development model through eighth grade in the CYDS.

The study examined three research questions: To what extent did CTC (a) increase overall levels of protection in a panel of community youth followed from Grade 5 through Grade 8; (b) increase protection in specific domains (peer-individual, family, school, community); and (c) increase specific protective factors within domains?

Methods

Description of CYDS

The CYDS is the first community-randomized trial of CTC to investigate whether CTC implementation decreased risk, increased protection, and reduced youth problem behaviors in communities. Communities in the CYDS were selected from 41 communities across the states of Colorado, Illinois, Kansas, Maine, Oregon, Utah, and Washington. These states previously had participated in a naturalistic study of the diffusion of science-based prevention strategies (Arthur, Glaser, & Hawkins, 2005). The state agencies responsible for drug abuse prevention in these states identified 20 communities that were trying to implement risk- and protection-focused prevention services. The 20 communities were matched within state on population size, racial and ethnic composition, economic indicators, and crime rates with comparison communities that were thought not to be using risk- and protection-focused prevention. During the 5 years of that study, 13 of the 20 community pairs did not advance in their use of science-based prevention to the point of implementing tested and effective preventive interventions to address community risks (Arthur et al., 2003) and were deemed eligible for inclusion in the CYDS. Recruitment of communities for the CYDS required securing letters from the superintendent of schools, the mayor or city manager, and the lead law enforcement officer of each community, agreeing for their community to be randomly assigned to receive CTC or serve as a control community, and agreeing to all data collection activities necessary for the project. From the 13 pairs of

eligible matched communities, 12 pairs were recruited for the CYDS study. One community from each matched pair was randomly assigned to either the intervention (CTC) or control condition by a coin toss. CYDS communities are incorporated towns with their own governmental, educational, and law enforcement structures, ranging in population size from 1,500 to 41,000 residents.

CTC Implementation

In the 12 intervention communities, CTC training and implementation began in the summer of 2003. All intervention communities received six trainings from CTC trainers over 9 to 12 months. Community leaders were introduced to the CTC system and identified an existing or created a new community coalition of diverse stakeholders to implement CTC. Coalition members were trained to use data collected using the CTC Youth Survey of 6th-, 8th-, 10th-, and 12th-grade students in 1998, 2000, and 2002 in the earlier study to (a) prioritize elevated risk factors to target with preventive actions, (b) choose tested and effective prevention policies and programs to address prioritized risk factors, (c) implement these policies and programs with fidelity, and (d) monitor implementation and outcomes of these newly installed policies and programs. Because the CYDS was initially funded for 5 years, CTC communities were asked to focus their prevention efforts on 10- to 14-year-old youths (Grades 5 through 9) and their families and schools so that possible effects on drug use and delinquency could be observed during the study period. During this time, CYDS implementation staff provided technical assistance through weekly phone calls and e-mails and yearly site visits to CTC communities. Control communities received data from the CTC Youth Surveys administered in their schools every 2 years, but no other training or technical assistance from the study.

Based on the community-specific profile of risk that emerged from the CTC Youth Survey data, CTC communities prioritized two to five risk factors to be targeted by prevention policies and programs. By June of 2004, intervention communities had selected interventions from a menu of tested and effective prevention policies and programs to address their prioritized risk factors and had made plans to implement these programs with fidelity. The programs selected had been found effective in reducing problem behaviors (i.e., substance use and delinquency) in at least one well-controlled trial (Hawkins & Catalano, 2004). Community coalitions implemented one to five tested programs, with an average of three programs, in their communities each year. The programs were implemented by local providers and community volunteers. Programs included universal school-based programs (e.g., All-Stars, Life Skills Training, Lion's Quest Skills for Adolescence, Project Alert, Olweus Bullying Prevention Program, and Program Development Evaluation Training), selective programs for youth thought to be at elevated risk (e.g., Participate and Learn Skills, Big Brothers Big Sisters, Stay Smart, and academic tutoring), and universal family-focused programs (e.g., Strengthening Families 10–14, Guiding Good Choices, Parents Who Care-Staying Connected with Your Teen, and Family Matters) (Fagan, Hanson, Hawkins, & Arthur, 2008b; Quinby et al., 2008).

Previous analyses found that CTC communities successfully implemented the CTC system with fidelity (Fagan, Hanson, Hawkins, & Arthur, 2009; Quinby et al., 2008) and reported

higher levels of adoption of a science-based approach to prevention 1.5 years after CTC implementation compared to control communities (Brown, Hawkins, Arthur, Briney, & Abbott, 2007). CTC communities had also selected and implemented more tested and effective prevention programs than control communities (Fagan, Hanson, Hawkins, & Arthur, 2008a). Investment in CTC was cost beneficial even under conservative benefit assumptions (Kuklinski, Briney, Hawkins, & Catalano, 2012).

Sample

Data used in the analyses were obtained from annual surveys of a panel of public school students who were in the fifth grade during the 2003 – 2004 academic year in the 24 CYDS communities (Brown et al., 2009). Tested and effective prevention programs were implemented in the 12 CTC communities starting in the summer and fall of 2004. The first wave of data was collected in the spring of 2004, when the panel was in Grade 5, and served as the pre-intervention baseline assessment. The second wave of data was collected in the spring of 2005 (Grade 6) and included an effort to recruit additional students who were not surveyed in Grade 5. Parents of 4,420 students (76.4% of the eligible students) provided written informed consent for their child's participation in the study. The consent rate did not differ by intervention condition (76.7% for students in control communities and 76.2% for students in CTC communities). Thirteen students whose parents provided consent were absent or refused to complete the survey. The final longitudinal panel included 4,407 students (2,405 from CTC communities and 2,002 from control communities) who completed a Wave 1 or Wave 2 survey. Students who remained in the communities for at least one semester were followed and surveyed for each subsequent wave of data collection, even if they left the community. The fourth wave of surveys collected in the spring of 2007, when students in the panel were in the eighth grade, was completed by 96.2% of the sample students (95.6% of the sample from CTC communities and 96.9% of the sample from control communities) in the longitudinal panel (see Figure 1 for full CONSORT diagram). There was no systematic bias due to differential attrition by intervention condition. When students in the panel were in the eighth grade, CTC intervention support had been available for 4 years and prevention programs had been implemented for 2.67 years in CTC communities.

Students completed the Youth Development Survey (YDS) (Social Development Research Group, 2005–2007), a self-administered paper survey, during a 50-minute class period in school. To ensure confidentiality, identification numbers were assigned but names and identifying information were not included on the surveys. Students read and signed assent forms indicating that they were fully informed of their rights and agreed to participate in the study. Students received small incentives worth $5 to $8 upon completion of the survey. The University of Washington Human Subjects Review Committee approved this procedure.

Measures

Fifteen **protective factors** specified in the social development strategy were assessed using scales consisting of two to six items each. These factors are divided into four domains – peer/individual, family, school, and community. Protective factors measured include opportunities and recognition for prosocial involvement in each domain, social skills,

attachment to the family and the community, commitment to school, and healthy beliefs and clear standards for behavior (for a theoretical explanation of each construct, see Catalano & Hawkins, 1996; Hawkins & Weis, 1985). Table 1 shows examples of scale items and each scale's internal reliability (Cronbach's alpha) in the YDS sample at Grade 8. (For a complete list of items used for each scale, please contact the corresponding author). To calculate protective factor scores, scale items were standardized and then averaged at each wave. To allow comparison of protective factor scores across time, scale scores were then standardized across all four waves of data. Each protective factor scale has shown good reliability in prior studies (Arthur et al., 2002).

Variables measuring **student and community characteristics** were included as covariates in analyses. Student characteristics included student's age at sixth-grade survey, gender (1 = female, 0 = male); race (1 = White, 0 = other); whether the student was Hispanic (1 = yes, 0 = no); parental education level (ranging from 1 = grade school or less to 6 = graduate or professional degree); religious attendance in Grade 5 (0 = never to 4 = about once a week or more); and rebelliousness, which consisted of the mean of three items: *I like to see how much I can get away with; I ignore rules that get in my way; and I do the opposite of what people tell me, just to get them mad* (1 = very false to 4 = very true). Community characteristics included the total student population and the percentage of students eligible for free or reduced-price school lunch. Because communities rather than students were randomized, intervention condition was a community-level variable (1 = CTC communities, 0 = control communities).

Missing Data

Among the 4,407 students in the longitudinal panel, 26.5% did not complete the survey in the first wave but were recruited in Grade 6 as part of an accretion sample. Only a small percentage of students (3.8%) were not available for a follow-up interview in Grade 8. Overall, 96.7% of the panel students participated in at least three of the four waves of data collection. Students' data (0.7% in Grade 5 and 1.4% in Grade 8) were excluded from analyses if they reported being honest only "some of the time" or less, having used a fictitious drug, or having used two of three drugs on 40 or more occasions in the past month. The final analysis sample included 4,182 students (2,272 from CTC communities and 1,910 from control communities). Missing data were accounted for using multiple imputation methods to obtain unbiased estimates of model parameters and their standard errors, assuming that data were missing at random (Schafer & Graham, 2002). Using NORM version 2.03 (Schafer, 2000), 40 separate datasets including data from all four waves were imputed separately by intervention condition (Graham, Taylor, Olchowski, & Cumsille, 2006). To facilitate computation, the number of variables in the imputation model was limited by imputing within domain (individual/peer, family, school, and community). Imputation models included student and community characteristics, protective factor scales within a domain across all 4 years, and community membership. Imputed datasets for each condition were combined and analyses were averaged across the 40 imputed datasets using Rubin's rules (Rubin, 1987).

Analyses

Given the nested design of the study, we used three-level hierarchical linear modeling to account for variation between students, communities, and matched pairs of communities (Raudenbush & Bryk, 2002). We estimated random intercept models using HLM version 6.0 (Raudenbush, Bryk, Cheong, & Congdon, 2004) to examine differences in the mean level of each of the protective factors measured in this study among youths in CTC and control communities at baseline and in Grade 8. The effects of all covariates (grand-mean centered) on eighth-grade protective factors were specified as fixed.

Communities were not instructed to choose specific protective factors for attention, but instead the CTC intervention encouraged coalition and community members to increase the overall level of protection community wide. Therefore, we hypothesized that CTC would lead to increased overall levels of protective factors community wide. To test this hypothesis, we calculated the Global Test Statistic (GTS) (Pocock, Geller, & Tsiatis, 1987) to assess the overall effect of CTC across all protective factors measured in this study. To examine the alternative hypothesis that CTC may have increased levels of protection only within certain domains (i.e., the community, family, school, or peer/individual domains), we also calculated the GTS across all protective factors within a domain.

The GTS detects the overall effect of an intervention on a group of outcomes hypothesized to be affected by the intervention in the same direction. The GTS calculates the average t-value across the estimated intervention effect for each individual outcome and adjusts it for the number of units, or communities in the study, the number of outcomes, and the correlations among the outcomes. Because this study is a community-randomized trial where the intervention effect occurs at the community level, correlations among outcomes at the community level were used to calculate the GTS (Feng & Thompson, 2002). The advantage of the GTS is that it accounts for multiple comparisons as well as the correlated nature of the protective factors specified in the SDM. Because the GTS is weighted by the intercorrelations among the multiple outcomes, highly correlated outcomes contribute less to the overall t-value than a less correlated outcome. Yet, the sum of the intervention effects on correlated outcomes has greater weight in the GTS than the single effect on an uncorrelated outcome (Pocock et al., 1987). The GTS is, thus, less conservative than a simple Bonferroni adjustment.

Results

CTC and control community youth were similar across community-level demographic characteristics (Table 2). Mean levels of protective factors at baseline in Grade 5 were not significantly different between control and CTC communities, with one exception: In Grade 5, the level of community attachment was significantly higher among youths in CTC communities than among controls (B = 0.093; p = 0.023). All analyses of eighth-grade protective factors included fifth-grade baseline levels of those protective factors as covariates.

The GTS across all protective factors (based on the results of the multilevel analyses of each protective factor) indicated that the overall level of protection was significantly higher in

CTC communities than in control communities at the end of Grade 8 (GTS t = 2.481, p = 0.021). This overall effect appears to be due to increases in protection in all but one of the protective factor domains. With the exception of the family domain (GTS t = 1.279, p = 0.214), levels of domain-specific protection were significantly higher in CTC compared to control communities in the community domain (GTS t = 2.328, p = 0.029), school domain (GTS t = 2.234, p = 0.018), and peer-individual domain (GTS t = 2.329, p = 0.029).

Figure 2 shows adjusted differences between CTC and control community youth in the mean levels of each protective factor in the domains where overall effects on protection were found. Four specific protective factors were significantly higher in CTC than control communities. Youths from CTC communities reported significantly higher levels of community opportunities for prosocial involvement (p = 0.004), school recognition for prosocial involvement (p = 0.025), interaction with prosocial peers (p = 0.050), and social skills (p = 0.025) than their control counterparts in the longitudinal panel after controlling for covariates and fifth-grade levels of these protective factors.

Discussion

The CTC prevention system uses a community activation strategy to achieve local collective impact on risk and protection with the aim of promoting positive youth development. Previous analyses of data from this community-randomized trial of CTC have shown that by the end of seventh grade, levels of targeted risk factors in the panel studied here were significantly lower in CTC compared to control communities after 3 years of CTC intervention and 1.67 years after implementation of evidence-based prevention programs began in CTC communities. The present study found that CTC also had a positive effect in building protection community wide and in the domains of community, school, and individual/peers at the end of eighth grade. These findings are consistent with the CTC theory of change (Hawkins et al., 2002) that includes the use of the social development strategy to enhance protective factors community-wide.

This study found a global increase in levels of protection in all but one of the domains assessed in this study. These improvements were primarily driven by statistically significant effects of CTC on four specific protective factors (community opportunities for prosocial involvement, school recognition for prosocial involvement, interaction with prosocial peers, and social skills). However, it is important to note that, consistent with the theoretical framework of CTC and the social development strategy, panel members reported higher levels of protection at the end of Grade 8 on all protective factors measured, even in the family domain. The advantage of the GTS to test a global intervention effect across a group of outcomes is that it gives credit to all of the individual outcomes, even those that are not significant at p < 0.05, while adjusting for multiple tests to retain a proper Type I error rate. However, when outcomes are highly correlated, as was the case in this study, the power to detect an overall effect is reduced. Community-level correlations among all protective factors measured in this study ranged from r = 0.39 to r = 0.89, with an average correlation of r = 0.65, but were particularly strong in the family domain (average r = 0.88). These strong intercorrelations may be one reason why the GTS was not significant in the family domain.

It is also possible that CTC may not have had a significant impact in increasing overall protection in the family domain because the saturation or reach of these programs was too low. Smaller numbers of parents participated in family programs offered in CTC communities (517 in 2004 – 2005; 665 in 2005 – 2006; 476 in 2006 – 2007) (Fagan et al., 2008b). Though resources and supports including child care, meals, and transportation were provided for families to reduce barriers to participation, recruiting families for parenting programs remained a challenge for most communities. On average, parenting programs implemented by CTC communities in this study served only 10% of the targeted population (Fagan et al., 2008b). More research is needed to understand the proportion of families that must be reached by parenting programs in order to achieve community-wide effects on protection in families.

The significant increases in the four community, school, and individual protective factors (community opportunities for prosocial involvement, school recognition for prosocial involvement, interaction with prosocial peers, and social skills) are plausible given that many CTC communities implemented programs that focused on increased opportunities for positive involvement in the community for young people, such as STARR and Big Brothers Big Sisters. Furthermore, all CTC communities implemented universal prevention curricula and programs in school settings that often included social and emotional skill building. Relatively large numbers of students participated in these programs each year (1,432 in 2004 – 2005; 3,886 in 2005 – 2006; 5,165 in 2006 – 2007 of an estimated population of 10,031 sixth- through eighth-grade students across all CTC communities) (Fagan et al., 2008b), which may explain the improvements in recognition for prosocial involvement in school, interaction with prosocial peers, and social skills. However, the design and measures of this study did not allow us to ascertain the relative contribution of specific elements of the CTC system, such as specific social and emotional skill-building curricula in schools. Selection and implementation of these programs are core components of the CTC system, and their effect cannot be disentangled from the use of the CTC planning system or of collaboration among coalition members in this study of 24 communities.

This study has limitations. The findings of the study may not be generalizable to large urban or suburban communities. The communities in CYDS are incorporated towns of 50,000 or fewer residents. In larger cities, CTC has been implemented in neighborhoods with 20,000 to 70,000 residents within the larger city. Thus the population sizes of the neighborhoods implementing CTC in large cities and the incorporated towns in this study do not differ greatly. However, CTC has not been experimentally tested in urban or suburban settings.

The results reported here may be biased if students in CTC communities were aware that their community was using the CTC approach as all protective factors were measured by students' self-reports. However, it is unlikely that students in either experimental or control communities knew that their community was part of an experimental research study or knew the experimental condition of their community. The student surveys were administered community wide in both CTC and control communities through schools. Since randomization was at the community level, not the individual level, students living in experimental or control communities were not likely to be aware of each other or of the fact that there was another community in their state in the other condition. Although students in

CTC communities participated in various prevention programs, students in control communities also participated in prevention programs.

There was baseline equivalence in protective factors by condition in all but one factor – students in CTC communities were significantly more strongly attached to their communities than students in control communities at the beginning of the study. Why this was the case is unclear given that all fifth graders in all 24 communities were eligible to participate in the study and consent rates did not differ significantly by condition. However, since communities and not individuals were matched and randomized in this study, variation in student characteristics is possible. For this reason, all analyses included important student characteristics as covariates.

Controlling for baseline differences in community attachment, we found that students' community attachment in eighth grade was not significantly stronger in CTC compared to control communities. Community attachment decreased from Grade 5 to Grade 8 for all students, but more steeply for students in CTC communities (analyses not shown). This differential developmental pattern suggests that regression to the mean may be the reason for the nonsignificant difference in Grade 8. While CTC increased overall protection in the community, and opportunities for community involvement specifically, it did not strengthen attachment to community as would be expected by the SDM.

Future studies should examine the sustained effects of CTC on overall levels of protection community wide beyond the study-supported period of CTC implementation. Levels of targeted risk factors continued to be lower in CTC compared to control communities when the panel of students was in 10th grade, one year after technical assistance and study-provided resources to the community ended (Hawkins et al., 2012). It would be important to know if sustained effects are also found for protective factors. It would also be useful to examine the degree to which observed effects of CTC on youth behavior and health outcomes (Hawkins et al., 2008; Hawkins et al., 2009; Hawkins et al., 2012) were mediated by effects of CTC on protective factors as expected by CTC's logic model. Finally, it will be important to determine whether CTC had a differential effect in increasing protection among high-risk youths compared to low- or moderate-risk youths.

The effect of CTC on overall levels of protection community wide is consistent with CTC's goal of transforming prevention systems at the community level (Brown et al., 2007). The findings indicate that prevention efforts led by community coalitions and grounded in prevention science can effectively enhance protection in communities.
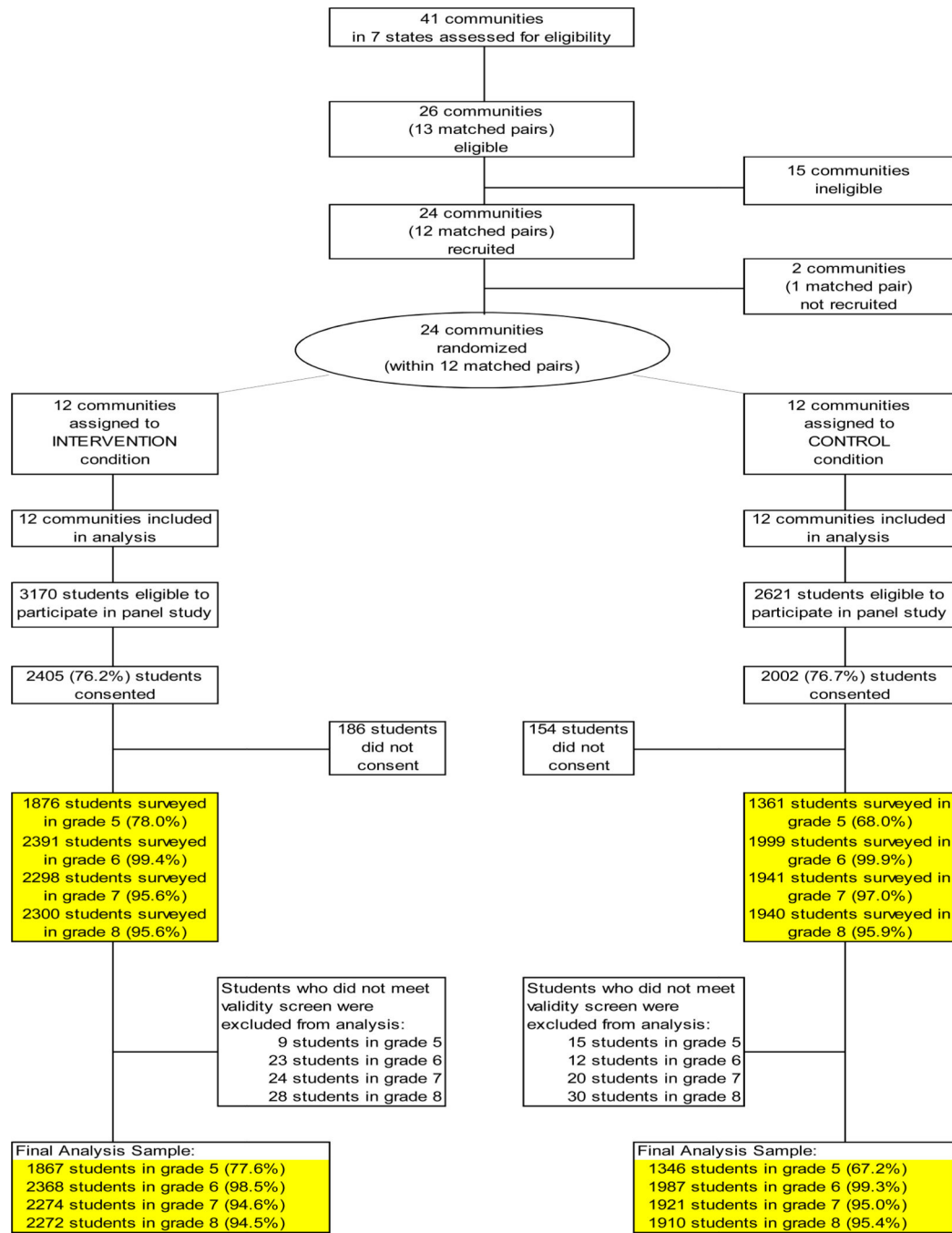
Acknowledgements

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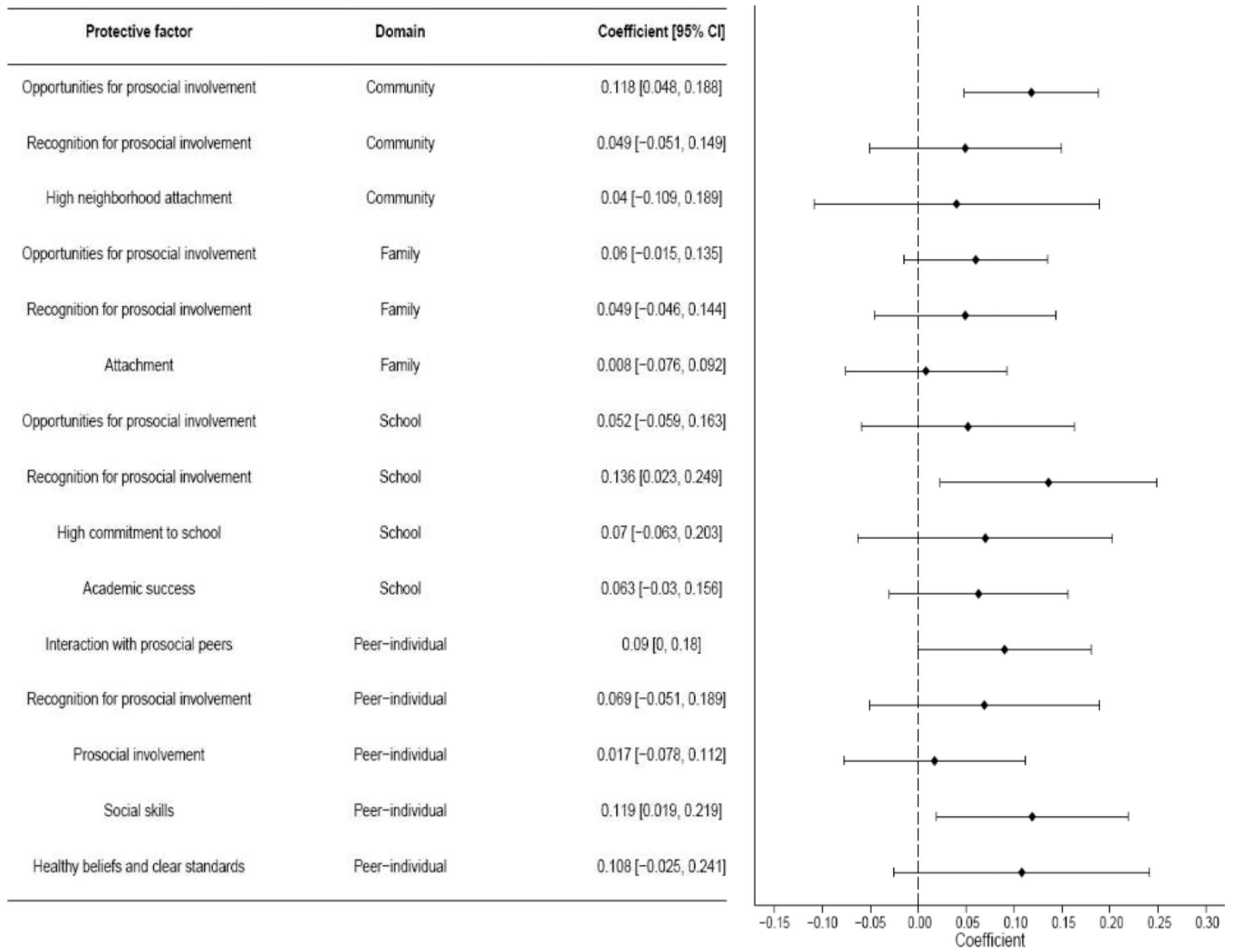
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Figure 1.
CONSORT Flow Diagram

Protective factor	Domain	Coefficient [95% CI]
Opportunities for prosocial involvement	Community	0.118 [0.048, 0.188]
Recognition for prosocial involvement	Community	0.049 [−0.051, 0.149]
High neighborhood attachment	Community	0.04 [−0.109, 0.189]
Opportunities for prosocial involvement	Family	0.06 [−0.015, 0.135]
Recognition for prosocial involvement	Family	0.049 [−0.046, 0.144]
Attachment	Family	0.008 [−0.076, 0.092]
Opportunities for prosocial involvement	School	0.052 [−0.059, 0.163]
Recognition for prosocial involvement	School	0.136 [0.023, 0.249]
High commitment to school	School	0.07 [−0.063, 0.203]
Academic success	School	0.063 [−0.03, 0.156]
Interaction with prosocial peers	Peer−individual	0.09 [0, 0.18]
Recognition for prosocial involvement	Peer−individual	0.069 [−0.051, 0.189]
Prosocial involvement	Peer−individual	0.017 [−0.078, 0.112]
Social skills	Peer−individual	0.119 [0.019, 0.219]
Healthy beliefs and clear standards	Peer−individual	0.108 [−0.025, 0.241]

Figure 2.
Adjusted difference in mean levels of eighth-grade protective factors comparing CTC to control communities.

Table 1

Protective Factors Assessed in Youth Development Survey

Scales	# of items (α)	Sample item
Community		
Opportunities for prosocial involvement	2 (0.78)	There are lots of adults in my neighborhood I can talk to about something important.
Recognition for prosocial involvement	3 (0.90)	My neighbors notice when I'm doing a good job and let me know about it.
High neighborhood attachment	3 (0.80)	I like my neighborhood.
Family		
Opportunities for prosocial involvement	3 (0.80)	My parents ask me what I think before most family decisions affecting me are made.
Recognition for prosocial involvement	4 (0.78)	My parents notice when I'm doing a good job and let me know about it.
Attachment	4 (0.78)	Do you feel very close to your mother?
School		
Opportunities for prosocial involvement	5 (0.71)	There are lots of chances to be part of class discussions or activities.
Recognition for prosocial involvement	4 (0.76)	My teachers notice when I'm doing a good job and let me know about it.
High commitment to school	6 (0.76)	Now thinking back over the past year in school, how often did you try to do your best work in school?
Academic success	2 (0.75)	Putting them all together, what were your grades like last year? (e.g., A's B's)
Peer - Individual		
Interaction with prosocial peers	5 (0.70)	In the past year (12 months), how many of your best friends have participated in clubs, organizations or activities at school?
Recognition for prosocial involvement	4 (0.84)	What are the chances you would be seen as cool if you worked hard at school?
Prosocial involvement	3 (0.67)	How many times in the past year (12 months) have you participated in clubs, organizations, or activities at school?
Social skills	4 (0.66)	You're at a store with friend. Your friend steals a magazine…What would you do now?
Healthy beliefs and clear standards	4 (0.74)	It is important to be honest with your parents, even if they become upset or you get punished.

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Table 2

Youth[a] Demographic Characteristics of 24 CYDS Communities

	Control Communities			CTC Communities		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Total Population [b]	3,960	559	11,001	4,014	458	9,455
Race/Ethnicity, % [b]						
European American	85.1	63.7	97.1	85.4	57.6	96.1
Hispanic Origin	13.1	0.9	54.7	13.1	1.0	76.4
African American	2.5	0.0	20.3	2.6	0.0	21.1
Eligible for Free/Reduced-Price Lunch, % [c]	38.2	20.6	63	34.9	20.7	65.9

[a] Youth under the age of 18

[b] (U.S. Census Bureau, 2000)

[c] (National Center for Education Statistics, 2002–2003)