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Assessing Sustained Effects of *Communities That Care* on Youth Protective Factors

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Abstract

Objective—The Communities That Care (CTC) prevention system seeks to build community capacity for a science-based approach to the promotion of healthy youth development. Prior research shows the positive effects of CTC on youth protective factors during CTC implementation. This research tests sustained effects of CTC on youth protective factors 1 year after external support to communities for CTC implementation ended.

Method—Data come from a community-randomized trial of CTC in 24 communities across 7 states. A panel of 4,407 youth in CTC and control communities was surveyed annually from Grade 5 through Grade 10. Youth reported their exposure to protective factors identified in the social development model. Global test statistics are calculated to examine effects of CTC across 15 protective factors in 5 domains (community, school, family, peer, and individual) assessed in Grade 10, 1 year after study support for CTC implementation ended. Analyses also examine variation in sustained effects by gender and baseline risk levels.

Results—Global effects of CTC on protective factors across all domains are not sustained in Grade 10. However, sustained domain-specific effects are observed in the individual domain for males, in the peer domain for females, and in the individual domain for youth with low-to-medium risk at baseline.

Conclusions—Greater emphasis on strengthening protective factors during high school might be needed to sustain broad effects of CTC on protective factors observed during middle school.

Keywords

protective factors; community intervention; gender; universal prevention; risk moderation; adolescents; social development model

Using empirical evidence to inform social work practice is consistent with the profession's commitment to beneficence and avoiding harm (Gambrill, 2006). Following Fraser's (2004, p. 210) argument that, "the essence of social work research is the study of intervention," social workers should critically examine how and in what ways research can inform practice (DePanfilis, 2014). Recent advances have enabled researchers to develop and test theory-driven interventions using the risk and protective factor framework of prevention science (Fraser, 2004). The basic premise of prevention science is that identifying and changing the levels of risk and protective factors that predict problems can reduce the likelihood that problems will occur (Coie et al., 1993; Hawkins, Catalano, & Miller, 1992)..

Despite the increased availability of prevention programs that have been tested and found to be effective (Catalano, Hawkins, Berglund, Pollard, & Arthur, 2002), untested and ineffective strategies are still commonly used (Fraser, Kirby, & Smokowski, 2004; Gambrill, 2006; Ringwalt et al., 2011; Rosen, 2003; Thyer & Myers, 2011). Communities That Care (CTC; Hawkins, Catalano, & Associates, 1992) seeks to provide communities with a structured approach for using scientific evidence and local knowledge to choose and implement tested and effective programs that address community-specific needs (Shapiro, Oesterle, Abbott, Arthur, & Hawkins, 2013). CTC training and technical assistance has been found to create a well-functioning coalition with strong linkages to diverse community sectors and stakeholder groups (Shapiro, Oesterle, & Hawkins, 2015). CTC coalitions are trained to assess levels of risk and protective factors among young people in their community using epidemiological data, to identify two to five prevalent risk factors in the community and target those risks for preventive action, to select and implement programs from a menu of evidence-based policies and programs with demonstrated effect on targeted risk factors, to monitor the implementation of these programs, and to re-assess risk and protective factors and problem behavior at regular intervals to determine progress and to adjust programming. The CTC system is expected to advance the community's use of scientific evidence to promote positive youth development (Shapiro, Oesterle, Monahan, et al., 2013).

The Community Youth Development Study (CYDS), a community-randomized trial of CTC, has found that the CTC prevention system had significant impact on levels of risk and protective factors and youth problem behaviors. As compared with youth in control communities, a panel of youth in CTC who were followed from Grade 5 reported significantly lower levels of targeted risk factors in Grade 7 (Hawkins, Brown, Oesterle, & Arthur, 2008); significantly higher levels of protective factors in Grade 8 (Kim, Gloppen, Rhew, Oesterle, & Hawkins, 2015); and significantly lower incidence of delinquent behavior and lower use of alcohol, cigarette, and smokeless tobacco in Grade 8 (Hawkins, Oesterle, Brown, & Arthur, 2009). The intervention phase of CYDS ended in the spring 2008, when panel students were in Grade 9. It is important to assess the sustained effects of

CTC beyond the intervention phase when the high-level of intervention support associated with the study is withdrawn (Stange, Goodwin, Zyzanski, & Dietrich, 2003). The current study examined the extent to which the effects of CTC on youth protective factors observed at the end of Grade 8 were maintained through Grade 10—that is, one year after study-provided funds and technical assistance to CTC communities in the CYDS ended.

Protective Factors

Interest in strengths-based approaches can be found across all areas of social work practice (Simmons, Shapiro, Accomazzo, & Manthey, 2015). Strengths-based social work involves engaging and leveraging resources in the individual and social environment to promote well-being (Saleebey, 2008; Simmons & Lehmann, 2013). CTC is a strengths-based approach to social work practice (Haggerty & Shapiro, 2013) that uses a risk and protective paradigm (Coie et al., 1993; Pollard, Hawkins, & Arthur, 1999) to identify individual and environmental strengths. Studies have identified protective factors in the individual, peer, family, school, and community domains shown to decrease the likelihood of problem behaviors and/or mitigate the effects of risk exposure (Bowers et al., 2011; Losel & Farrington, 2012).

This study examined the effects of CTC on protective factors identified by the Social Development Model (SDM; Catalano & Hawkins, 1996; Hawkins & Weis, 1985), which included opportunities for prosocial involvement, skills for prosocial interaction, recognition for prosocial involvement, commitment and attachment to prosocial others, and healthy beliefs and clear standards for prosocial behavior. The SDM posits that providing young people with opportunities, skills, and recognition for prosocial behavior will strengthen young people's commitment and attachment to important socializing units (e.g., parents, the school, prosocial peers, or the community) that regularly provide these opportunities, skills, and recognition. If this bond of attachment and commitment is strong, the young person will adopt the beliefs and standards of that socializing unit and will engage in prosocial behaviors and avoid antisocial and health-compromising behaviors. This prosocial pathway of the SDM is called the *social development strategy* (SDS). The SDM asserts that a similar process is involved in the development of antisocial behavior: If opportunities, skills, and recognition are provided by others who engage in health-compromising or antisocial behaviors (e.g., substance using parents or delinquent peers), young people will be more likely to engage in antisocial behaviors themselves.

The theoretical constructs of the SDM have been validated with diverse populations (Catalano, Oxford, Harachi, Abbott, & Haggerty, 1999; Fleming, Catalano, Oxford, & Harachi, 2002; Roosa et al., 2011; Sullivan & Hirschfield, 2011) across multiple developmental periods, and in relationship to a range of health-compromising or antisocial behaviors (Laundra, Kiger, & Bahr, 2002; Kosterman, Haggerty, Spoth, & Redmond, 2004). Several prevention programs have been developed to promote the use of the SDS (e.g., Seattle Social Development Project, Raising Healthy Children, Guiding Good Choices) and have been shown to positively affect the SDM constructs and reduce substance use, delinquency, and mental health problems (Catalano, Kosterman, Haggerty, Hawkins, &

Spoth, 1998; Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; Mason, Kosterman, Hawkins, Haggerty, & Spoth, 2003).

As part of the CTC process, prevention coalitions are trained to encourage all adults in the community to use the SDS in their daily interactions with young people. Because CTC promotes use of the SDS and effective prevention programs that provide prosocial opportunities, skills, and recognition to youth, we expected CTC to positively affect youth protective factors.

Subgroup Differences

CTC is intended to have community-wide effects on the youth population. Although community-wide approaches are expected to benefit the population as a whole, some universal programs have been found to have differential impact on different segments of the exposed population (Allen & Philliber, 2001; Kellam et al., 2008; Kulis, Yabiku, Marsiglia, Nieri, & Crossman, 2007; Mason et al., 2009). Testing CTC effects on protective factors in youth subpopulations is important for informing community decision-making. If the implementation of CTC yields positive effects on protective factors for certain subgroups but not others, communities can use this information to adjust programming in accordance to their goals.

Variation in the impact of CTC by gender

A growing body of evidence has suggested that prevention programs can have differential impact by gender (Blake, Amaro, Schwartz, & Flinchbaugh, 2001; Fagan & Lindsey, 2014; Foley, 2008). Prior analyses have found that CTC produced greater reductions in use of alcohol and smokeless tobacco among boys than girls by Grade 8 (Oesterle, Hawkins, Fagan, Abbott, & Catalano, 2010) and a marginally greater reduction in delinquency for boys than for girls in Grade 10 (Oesterle et al., 2014). Although no studies have yet examined variation in the effects of CTC on protective factors for boys and girls, there is reason to expect that CTC has affected protective factors differently for boys and girls. Etiological studies, including data from CYDS, have shown that among children in the same communities, boys had greater exposure to risk factors and lower levels of protective factors than girls (Kim, Oesterle, Catalano, & Hawkins, 2015; Fagan, Van Horn, Hawkins, & Arthur, 2007). Thus, if protective factors are generally lower for boys than girls, it might be easier for prevention efforts such as CTC to raise levels of protective factors among boys. Moreover, the norms of gender socialization might play a role when families, teachers, and community members apply the SDS. These adults might provide boys and girls with different kinds of opportunities and recognition for various prosocial behaviors based on the child's gender. For example, because girls generally do better in school compared with boys, teachers might reward girls less for their academic achievement (Witherspoon & Ennett, 2011). In contrast, because teachers might have lower expectations for boys to do well in school, boys might be rewarded more for their academic success. Understanding the extent to which prevention programs differentially affect risk and protective factors by gender could illuminate pathways to gender differences in the effects of preventive interventions on problem behaviors.

Variation in the impact of CTC by baseline risk

Prevention strategies that provide youth with opportunities, skills, and recognition could have different levels of benefit for youth exposed to high levels of risk versus those exposed to lower levels of risk. Research evidence has suggested that as compared with individuals who have low levels of risk exposure, individuals exposed to high levels of risk generally develop lower levels of protection (Pollard et al., 1999). Thus, it is possible that individuals exposed to high levels of risk would benefit more from interventions that increase protective factors (i.e., because of their low baseline levels of protective factors) than would those with low levels of risk exposure. Alternatively, interventions focused on strengthening protection might have smaller effects on those at high risk because their risk exposure could inhibit the development of protective factors such as opportunities for prosocial involvement or social and emotional skills.

In the context of prevention, individuals are considered to be at high risk if they have individual characteristics and environmental exposures that predict greater likelihood of developing problem behaviors (Coie et al., 1993; Webster-Stratton & Taylor, 2001). Studies have varied in the way in which they defined high risk, including low socioeconomic status (Bradley & Corwyn, 2002), low IQ (Buelow et al., 2003), early behavior problems (Windle & Windle, 2012), and family conflict (Bradley & Corwyn, 2000). Findings have been mixed on differential effects of universal preventive interventions by risk-related subgroups. Some studies have found significant positive program effects for only those at high risk (Kellam et al., 2008), whereas others have found effects for both low- and high-risk groups, but found larger effects for one group than the other (Allen & Philliber, 2001; Eisen, Zellman, & Murray, 2003; Gardner et al., 2009; Spoth et al., 2007). Prior analyses of subgroup effects on problem behavior in the CYDS identified high-risk youth as those with elevated risk exposure on the risk factors that were prioritized and targeted by the CTC community in which the youth lived. These analyses did not find differential effects of CTC by baseline levels of targeted risk on substance use or delinquency among students in Grade 8 or Grade 10 (Oesterle et al., 2010; Oesterle et al., 2014).

In the present study, we sought to understand whether CTC had a differential sustained effect on protective factors among individuals at high risk versus those at medium or low risk at baseline. For these analyses, we defined high risk as the cumulative level of exposure to all measured risk factors across the domains of community, school, family, peers, and individual. When trying to understand whether CTC had a more positive impact on protective factors among those individuals with generally high risk compared with low risk at baseline, it might be relevant to define high risk in a comprehensive way. The CTC process was expected to impact protective factors for both high and medium-to-low risk youth through the universal use of the SDS by community adults and through the implementation of universal and selective prevention programs. Given findings from evaluations of other preventive interventions that found differential effects on problem behavior by risk levels despite their universal prevention goals, it is important to examine the extent to which the CTC process had differential effects on protective factors across risk-related subgroups.

Methods

The CYDS used a community-randomized design to investigate whether CTC implementation decreased risk factors, increased protective factors, and reduced youth problem behaviors in communities. The 24 communities in the CYDS were originally identified by state agencies responsible for drug abuse prevention in Washington, Maine, Colorado, Illinois, Kansas, Oregon, and Utah (Arthur, Glaser, & Hawkins, 2005). Communities were matched within their states based on population size, economic indicators, and crime rates. At the outset of the study, the paired communities did not differ on their use of science-based prevention (Arthur, Ayers, Graham, & Hawkins, 2003) or on prevalence of youth problem behaviors (Brown et al., 2009; Hawkins, Catalano, Arthur, & Egan, 2008). Recruitment of communities for the CYDS required securing agreement letters to community random assignment from the mayor or city manager, the school superintendent, and the lead law enforcement officer in each community. Communities in each matched community pair were randomly assigned to either the intervention (CTC) or control condition by a coin toss (See Figure 1 for CONSORT diagram). CYDS communities were incorporated towns with their own governmental, educational, and law enforcement structures, ranging in population size from 1,500 to 41,000 residents (See Table 1).

In the summer 2003, 12 intervention communities began the CTC implementation process by receiving six trainings over 9 to 12 months. Community leaders identified or created a community coalition of diverse stakeholders to implement CTC. To inform their prevention service delivery, coalition members were trained to collect CTC Youth Survey (CTC-YS) data from students in Grades 6, 8, 10, and 12. Although CTC is not designed to focus on a particular age range, CTC communities in the trial were asked to focus their prevention efforts on youth in Grade 5 through Grade 9 so that potential effects on delinquency and drug use could be observed during the initially funded 5-year study period. During this period, the study provided CTC communities with technical assistance and financial support for the implementation of chosen preventive programs. Control communities received data from the CTC-YS administered in their schools every 2 years, but no other training, technical assistance, or funding through the study.

Using CTC-YS data, CTC communities prioritized two to five risk factors to be targeted through prevention programs and policies. By June 2004, intervention communities had selected prevention programs or policies from a menu of programs that had been tested and found to be effective in reducing problem behaviors of substance use or delinquency in at least one well-controlled trial (Hawkins & Catalano, 2004). Community coalitions implemented an average of three programs at a time in their communities (Fagan, Hanson, Hawkins, & Arthur, 2008a; Quinby et al., 2008). Programs included universal school-based programs, universal family-focused programs, and selective programs for youth thought to be at elevated risk. Communities were not required to prioritize and target specific protective factors, but coalition members encouraged all adults in the community to use the SDS in their daily interactions with young people.

Previous analyses found that CTC communities successfully implemented the CTC system with fidelity, implementing 90% of the core components of the CTC system (Fagan et al.,

2009; Quinby et al., 2008), and community key leaders (e.g., mayor, police chief) reported higher levels of adoption of a science-based approach to prevention 1.5 years after CTC implementation compared with control communities (Brown, Hawkins, Arthur, Briney, & Abbott, 2007). CTC communities also selected and implemented more tested and effective prevention programs than control communities, and CTC communities' implementations had high adherence to core program components, high-quality delivery, and met the required dosage (Fagan et al., 2008b). Even after program supports had ended (e.g., study training, technical assistance, and financial support had ended, key leaders in CTC communities continued to report higher levels of adoption of a science-based approach to prevention than control communities (Rhew, Brown, Hawkins, & Briney, 2013). One year after study support and funding for communities were discontinued, CTC coalitions were largely still engaged with CTC activities (Gloppen, Arthur, Hawkins, & Shapiro, 2012) and continued to report higher use of tested and effective prevention programs as compared with their control counterparts (Fagan, Hanson, Briney, & Hawkins, 2012).

Sample

Data for this study came from annual surveys of a panel of public school students who were in Grade 5 during the 2003–04 academic year in the 24 CYDS communities (Brown et al., 2009). Grade 5 data collected in spring 2004 served as the preintervention baseline assessment because CTC communities did not start implementing tested and effective prevention programs until the summer or fall 2004. The second wave of data was collected in spring 2005 (Grade 6) and added students who had not been consented in Grade 5. Parents of 4,420 students (76.4% of the eligible students; 76.2% in CTC communities; 76.7% in control communities) provided written informed consent for their child's participation in the study. Students who completed a Wave 1 or Wave 2 survey and remained in the communities for at least one semester ($N = 4,407$) were included in the final longitudinal panel. Students were followed and surveyed for each subsequent wave of data collection even if they left the community or dropped out of school (2,405 from CTC communities and 2,002 from control communities). The sixth wave of surveys was collected in spring 2009, when students in the panel were in Grade 10; this wave was completed by 93.8% of panel members (see Figure 1). Attrition did not differ significantly by intervention condition (6.8 % from CTC communities and 5.4% from control communities). At the time of the Grade 10 survey, CTC communities had been implementing prevention programs for more than 4.5 years, but study support for the implementation of CTC had ended a year earlier. Because most CTC coalitions implemented preventive interventions focused on students in Grades 5 to 9, panel students in CTC communities were unlikely to have received CTC-initiated prevention programming during Grade 10.

Instrument and Measures

During a 50-minute class period in school, students completed the Youth Development Survey (YDS; Social Development Research Group, 2005–2009), a self-administered paper questionnaire. To ensure confidentiality, identification numbers replaced identifying information. Students assented to their participation in the study and received small incentives worth \$5 to \$8. This procedure was approved by the Human Subjects Committee of a large U.S. university.

Protective factors—Protective factors specified in the SDS were assessed through the YDS using six scales consisting of two to six items each:

- opportunities for prosocial involvement in the community, the family, the school, and with peers;
- skills for interaction and academic success;
- prosocial involvement by individuals and prosocial interaction with peers;
- recognition for prosocial involvement by the community, the family, the school, and peers;
- attachment to the community and the family, and commitment to school; and
- healthy beliefs and clear standards for behavior (Table 2).

Items measuring each construct (15 scales) were standardized at each wave and averaged to calculate the scale score. To enable comparison of protective factor scores across time, scale scores were standardized across all six waves from Grades 5 through 10. These scales showed good reliability consistent with prior studies (Arthur et al., 2002).

Baseline risk—Baseline risk was assessed in Grade 5 across the same five domains (i.e., community, school, family, peers, and individual). To calculate a risk-factor score at baseline, standardized scores on 13 risk-factor scales derived from the SDM were averaged across all domains (See Table 2). The baseline risk-factor score was then dichotomized into high risk (top 25% of score distribution, coded 1) and medium-to-low risk (bottom 75% of score distribution, coded 0). This division was made to evaluate the CTC effect on protective factors in Grade 10 among youth who had a high level of risk exposure at baseline compared with those who were not at high risk. The top 25% cutoff has been shown to be a useful split to study nonlinear relationships and interaction effects in the context of multiple risk factors (Farrington & Loeber, 2000).

Control variables—Student and community demographic characteristics as well as the respective baseline protective factors were included in analyses to limit the possibility that any differences in sample composition by condition might be responsible for observed intervention differences in protective factors. Community characteristics included the total student population in the community (as a measure of community size) and the percentage of students eligible for free or reduced-price school lunch (as a measure of community poverty). Because randomization occurred at the community level rather than the student level, the *intervention condition* (CTC = 1, control = 0) was included as a community-level variable. Student characteristics included student's *age*, *gender* (*boy* = 1, *girl* = 0); *race* (*White* = 1, *other* = 0); whether the student was *Hispanic* (*yes* = 1, *no* = 0); *parental education level* (ranging from *grade-school-or-less* = 1 to *graduate-or-professional-degree* = 6); *religious attendance in Grade 5* (*never* = 0 to *once-a-week-or-more* = 4); and *rebelliousness* ($\alpha = .69$), 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" (*very false* = 1 to *very true* = 4). In the risk subsample analyses, Grade 5 rebelliousness was included in calculating the baseline risk-

factor score. In the full sample and gender subsample analyses, Grade 5 rebelliousness was included as a control variable because empirical evidence has suggested rebelliousness is associated with protective factors (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002).

Missing Data

Multiple imputation methods were used 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 data sets including data from all six waves from Grade 5 through Grade 10 were imputed separately by intervention condition (Graham, Taylor, Olchowski, & Cumsille, 2006). To facilitate imputation in the presence of a large number of variables, variables were imputed within protective factor domains (i.e., individual, peer, family, school, and community). Imputation models included student and community characteristics, protective factors within one domain across all 6 years, baseline risk factor scales, and community membership. Imputed data sets for each condition were combined and analyses were averaged across the 40 imputed datasets using Rubin's rules (Rubin, 1987).

Analysis

We used three-level hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) to examine variation in the mean level of each protective factor among youth in CTC communities and control communities in Grade 10, controlling for baseline level of the respective protective factor measured in Grade 5 and individual and community characteristics (grand mean centered). We estimated separate random intercept models for each protective factor to account for variation within students (Level 1), students within communities (Level 2), and communities within matched pairs of communities (Level 3). To obtain an estimate of the effect size (and confidence interval) in each subgroup of interest, we conducted separate analyses by gender and baseline risk group. All analyses were conducted using HLM version 6.0 (Raudenbush, Bryk, Cheong, & Congdon, 2004). The statistical significance of the intervention effect was tested with 9 degrees of freedom and a 0.05 Type I error rate (2-tailed).

Because the CTC process uses the SDS to increase protective factors in the community generally and because some CTC communities did not target specific protective factors with preventive interventions, we expected to see a general increase across all protective factors and domains in CTC compared with control communities. To examine an overall effect of CTC on protective factors, we calculated the global test statistic (GTS; Feng & Thompson, 2002). The GTS is based on the average t-value from the individual multilevel analyses of each protective factor, taking into account the number of outcomes, the variation between communities, and the community-level correlation among outcomes. By interpreting only the global effect across multiple specific protective factors, this procedure protects against the risk of an increased Type I error (Feng & Thompson, 2002; Pocock, Geller, & Tsatis, 1987). Further, the GTS t-values have been shown to require a moderate-to-large effect size to have enough statistical power to detect intervention effects when outcomes of interest are highly correlated with one another, as is the case for protective factors measured in this study. This suggests that statistical significance of the GTS is reliable even when individual

outcomes do not reach statistical significance (Feng & Thompson, 2002). To examine domain-specific effects of CTC, the GTS values were also calculated for each domain (i.e., individual, peer, family, school, community).

Results

Previous findings from the end of Grade 8 reported a statistically significant global effect of CTC on increasing protective factors among youth in CTC communities compared with those in control communities (Kim et al., 2015). The statistically significant global effect on protective factors across all domains was not sustained at the end of Grade 10, which was a year after study support was withdrawn and when students in CTC communities were unlikely to have had ongoing exposure to CTC-initiated preventative interventions (Table 3). Although, as compared with youth in control communities, panel youth in CTC communities continued to report higher levels of protective factors in all domains (Table 3), these differences were not statistically significant. Results for each individual protective factor are included in Appendix A1.

Analyses by Gender

Subgroup analyses by gender did not show a statistically significant global effect of CTC on protective factors across all domains for either gender (See Table 3). However, two statistically significant global effects were found. Grade 10 boys in CTC communities reported significantly higher levels of protective factors in the individual domain than boys in control communities. Grade 10 girls in CTC communities reported significantly higher levels of protective factors in the peer domain than did girls in control communities. These domain-specific effects were largely due to significantly higher levels of skills for interaction ($p = 0.023$) and healthy beliefs ($p = 0.048$) among boys and significantly greater interaction with prosocial peers ($p = 0.039$) among girls (see Appendix Table A2).

Analyses by Baseline Risk

CTC did not have a sustained overall global effect on protective factors at Grade 10 for those at medium-to-low risk at baseline or for the high-risk group (See Table 3). However, CTC youth in the medium-to-low risk group reported significantly higher levels of protective factors in the individual domain compared to youth at medium-to-low risk in control communities. This domain-specific effect was primarily due to significantly higher levels of healthy beliefs ($p = 0.016$) in the medium-to-low risk group (see Appendix Table A2). No domain-specific global protective effect was found for the high-risk group.

Discussion

This article examined the extent to which effects of CTC on youth protective factors observed at the end of Grade 8 (Kim et al., 2015) were sustained in the CYDS panel through Grade 10, one year after funding and technical assistance to CTC communities in the CYDS ended. This article also examined whether effects on protective factors at Grade 10 varied by gender and baseline risk.

In this study, we used a unique statistical method to assess the effect of CTC across all protective factors. Specifically, we used the global test statistic (GTS) to reduce the increased risk of a Type I error in the context of multiple outcomes. The commonly used Bonferroni correction is an efficient tool to correct for Type I error; however, by focusing on one extreme *p*-value, the Bonferroni correction reduces the power to detect true treatment effects (Pocock, 1997). Although not as conservative as the Bonferroni correction, the GTS is designed to examine consistent patterns across different outcomes while correcting for the number of comparisons as well as to account for community-level correlations, which are especially important in a community-randomized trial. Thus, use of the GTS also prevents over interpreting the statistical significance of each outcome.

The global effect of CTC on overall levels of protection observed in Grade 8 was not sustained in Grade 10. This finding might be because CTC communities in this study implemented preventive interventions primarily focused on middle-school youth (i.e., Grades 6 through 8). In addition, although CTC communities were encouraged to use the SDS in their daily interactions with young people, these communities were not required to target specific protective factors in selecting preventive interventions. The current findings suggest that continued prevention programming focused on building protection during the high school years might be necessary to sustain the overall effects on protection through Grade 10. Although studies have examined the effect of preventive interventions on specific protective factors (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004), no study has examined the sustained global effect of preventive interventions on protective factors.

We found sustained effects on protective factors in the individual domain for boys and in the peer domain for girls. The sustained effects on individual protective factors for boys appear to have been driven, in part, by observed sustained effects on skills for interaction measured by the ability to refuse others' request to engage in problem behaviors (see Appendix A2). These skills were taught in the universal prevention curricula ultimately adopted and used in all the CTC communities in the study. Without intervention, boys generally have lower levels of these skills than girls (Kim et al., 2015). This difference might explain why sustained significant increases in these skills were observed only for boys. This finding might also explain, in part, why CTC was found to have a stronger sustained effect among boys than girls on reducing delinquency in Grade 10 (Oesterle et al., 2004). The sustained effects on peer protective factors for girls seem to have been largely driven by sustained effects on prosocial interaction with peers (see Appendix A2). As mentioned above, without intervention, girls generally have higher levels of individual protective factors (Kim et al., 2015) and might have had less room to improve. However, preventive interventions carried out in the context of CTC may have increased girls' exposure to other peers also engaged in programs and extracurricular activities. Further studies are warranted to understand why these gender differences are observed.

Finally, we found sustained effects on protective factors in the individual domain for youth at low-to-moderate risk at baseline. Despite the implementation of selective prevention programs for high-risk youth such as Big Brother and Big Sisters and tutoring for those experiencing academic difficulties in CTC communities, CTC had greater sustained effects on individual protective factor for those at medium-to-low risk than for those at high risk.

This finding might reflect the fact that recruitment into tutoring and afterschool programs for high-risk youth was more difficult as compared with recruitment for universal programs, and thus, achieved limited reach (Fagan et al., 2009). It is also possible that the lack of significant sustained effects on individual protective factors for those at high risk indicates difficulty of sustaining and using refusal skills in the face of high cumulative risk exposure. It is important for CTC coalitions to ensure that selective programs reach all those at risk and eligible for participation even while implementing universal preventive programs.

The sustained effects observed in the individual and peer domains but not in the school or family domains are consistent with the findings from the randomized trial of the PROSPER study (Redmond et al., 2009). Initially, the PROSPER study found statistically significant effects on a variety of protective factors in the family and individual domains among seventh grade students. In their long-term follow-up assessments of ninth graders, Redmond and colleagues (2009) reported statistically significant effects on multiple protective factors in the individual domain but considerably fewer significant effects in the family domain. This finding suggests that additional family and school prevention programming is needed during the high school years to sustain the effects on family and school protective factors.

This study has limitations. Data are reports of youth from small incorporated towns, and therefore, findings from this study might not generalize to youth living in larger cities. However, CTC has been implemented in larger cities in neighborhoods comparable in size to the communities that implemented CTC in this study. Nevertheless, CTC has not been experimentally tested in urban settings.

This study is one of few investigations to examine the effects of a community-wide prevention system on youth protective factors by gender and by baseline risk subgroups. Studies evaluating whether prevention programs are equally effective across gender groups are important given differences observed in the strength of relationships between risk and protective factors and youth outcomes and the differences in exposure to risk between genders (Blake et al., 2001; Fagan et al., 2007). It is also important to understand possible differences in effects on protective factors for those with different levels of risk exposure because studies have found that youth exposed to higher levels of risk often fail to develop high levels of protection (Pollard et al., 1999). In particular, assessing intervention effects when communities are implementing CTC on their own has practical implications in that such assessment can uncover potential areas of community prevention service delivery that can be improved (e.g., choose more selective programs, gender-specific programs). Further, examining protective factors as outcomes might not only reveal different processes through which CTC affects subgroups but also illuminate pathways for the reduction of health and educational disparities (Fraser & Galinsky, 2010; Gardner et al., 2009).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Flow of Study Communities and Participants

Table 1

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

Note. CYDS = Community Youth Development Study. CTC = Communities That Care.

^aYouth younger than 18 years old

^bU.S. Census Bureau, 2000

^cNational Center for Education Statistics, 2002–2003.

Table 2**Protective Factor (Grade 10) Scales and Risk Factor (Grade 5)**

Protective Factor Scales	<i>a</i>	Sample item
COMMUNITY		
Opportunities for prosocial involvement	.80	There are lots of adults in my neighborhood I can talk to about something important
Recognition for prosocial involvement	.91	My neighbors notice when I'm doing a good job and let me know about it
High neighborhood attachment	.81	I like my neighborhood
FAMILY		
Opportunities for prosocial involvement	.82	My parents ask me what I think before most family decisions affecting me are made
Recognition for prosocial involvement	.76	My parents notice when I'm doing a good job and let me know about it
Attachment	.77	Do you feel very close to your mother?
SCHOOL		
Opportunities for prosocial involvement	.70	There are lots of chances to be part of class discussions or activities
Academic success	.76	Putting them all together, what were your grades like last year?
Recognition for prosocial involvement	.75	My teachers notice when I'm doing a good job and let me know about it
High commitment to school	.77	Now thinking back over the past year in school, how often did you try to do your best work in school?
PEER		
Prosocial interaction with peers	.74	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	.84	What are the chances you would be seen as cool if you worked hard at school?
INDIVIDUAL		
Prosocial involvement	.70	How many times in the past year (12 months) have you participated in clubs, organizations, or activities at school?
Skills for interaction	.64	You're at a store with friend. Your friend steals a magazine ... What would you do now?
Healthy beliefs and clear standards	.69	It is important to be honest with your parents, even if they become upset or you get punished
Risk Factor Scales^a		
Community Domain		
Perceived availability of drugs	.75	If you wanted to get marijuana, how easy would it be for you to get some?
Laws/norms favorable to drug use	.76	How wrong would most adults (over 21) in your neighborhood think it is for kids your age to use marijuana?
Family Domain		
Family history of antisocial behavior	.69	Has anyone in your family ever had a severe alcohol or drug problem?
Poor family management	.67	If you skipped school, would you be caught by your parents?
Family conflict	.74	People in my family often insult or yell at each other.
Individual Domain		
Rebelliousness	.69	I do the opposite of what people tell me, just to get them mad.
Perceived risk of drug use	.96	How much do you think people risk harming themselves (physically or in other ways) if they smoke one or more packs of cigarettes per day?
Favorable attitudes-drug use	.79	How wrong do you think it is for someone your age to smoke cigarettes?
Favorable attitudes-antisocial behavior	.75	How wrong do you think it is for someone your age to attack someone with the idea of seriously hurting them?
Intentions to use drugs	.65	Please tell me how true these statements may be for you. When I am an adult I will smoke cigarettes.

Protective Factor Scales	<i>a</i>	Sample item
Peer Domain		
Recognition for antisocial involvement	.89	What are the chances you would be seen as cool if you smoked cigarettes?
Friends' use of drugs	.79	In the past year (12 months), how many of your best friends have used marijuana?
Interaction with antisocial peers	.66	In the past year (12 months), how many of your best friends have stolen something worth more than \$5?

^a Cumulative risk composite was created taking the average across these risk factors.

Table 3

Global Test Statistics^a in Full Sample, by Gender and Baseline Risk

Domain	Full sample		Boys		Girls		High risk		Medium-to-low Risk	
	GTS t	p	GTS t	p	GTS t	p	GTS t	p	GTS t	p
All	1.446	0.176	1.761	0.106	0.770	0.458	0.015	0.988	2.072	0.063
Community	0.948	0.363	1.399	0.189	0.235	0.818	0.530	0.606	1.082	0.302
Family	1.445	0.176	1.698	0.117	0.852	0.412	-0.024	0.982	2.118	0.058
School	0.072	0.944	0.148	0.885	0.065	0.95	-1.458	0.173	0.852	0.412
Peer	1.667	0.124	1.196	0.257	2.393	0.036	2.024	0.068	1.703	0.117
Individual	1.642	0.129	2.274	0.044	0.054	0.958	-0.362	0.724	2.261	0.045

Note. GTS = global test statistic

^a GTS values were calculated based on the individual HLM (hierarchical linear modeling) analyses (See Appendix for details)