Published in final edited form as:

J Community Psychol. 2016 January ; 44(1): 78–89. doi:10.1002/jcop.21743.

Sustaining Adoption of Science-based Prevention Through Communities That Care

Kari M. Gloppen¹, Eric C. Brown¹, Bradley H. Wagenaar², J. David Hawkins¹, Isaac C. Rhew³, and Sabrina Oesterle¹

¹Social Development Research Group, University of Washington School of Social Work

²University of Washington School of Public Health

³Department of Psychiatry and Behavioral Sciences, University of Washington School of Medicine

Community-level efforts to promote health and prevent adolescent behavioral health problems including substance use, violence, and delinquency are a key component of Healthy People 2020 (U.S. Department of Health and Human Services, 2013). While a number of evidence-based preventive interventions are now available (Mihalic, Fagan, Irwin, Ballard, & Elliott, 2004; Substance Abuse and Mental Health Services Administration, 2013), these interventions have not been implemented as widely as they could be (Kerner, Rimer, & Emmons, 2005). A science-guided approach that stimulates the selection and implementation of tested and effective preventive interventions has been recommended to improve community efforts to achieve these priorities. Even when effective interventions are used, behavior change takes time, so increasing the sustainability of communities' efforts in science-based prevention is critical to achieving real change in adolescent behavior.

Communities That Care (CTC) is a coalition-based prevention system that seeks to build collaboration among community leaders to implement a science-based approach to prevention in their community (Hawkins & Catalano, 1992). The CTC theory of change is based on the adoption of science-based prevention, collaboration regarding prevention issues, community support for prevention, clear community norms against adolescent substance use, and use of the social development strategy to transform the prevention system in the community. These system transformation constructs are stimulated by CTC training, technical assistance, and on-going system monitoring. These constructs are hypothesized to affect the choice and implementation of evidence-based prevention policies and programs as well as affect the risk, protection, and health and behavior outcomes among community adolescents (see Figure 1). Adoption of a science-based approach to prevention is thought to be a key mechanism through which CTC enables communities to achieve positive youth outcomes community wide (Arthur, Glaser, & Hawkins, 2005). A science-based approach to prevention includes focusing prevention efforts on empirically identified risk and protective factors; collecting epidemiologic data on these risk and protective factors and behavioral health outcomes to guide the choice of preventive interventions; selecting and implementing tested and effective prevention policies and programs to address widespread risks; and continuously monitoring community levels of risk, protection, and outcomes for long-term goal achievement (Brown, Hawkins, Arthur, Briney, & Fagan, 2011).

We have hypothesized that through CTC training and technical assistance, community leaders and coalition members develop increased capacity to support and use science-based prevention (Hawkins, Catalano, Arthur, & Egan, 2008). In CTC communities, key leaders (e.g., mayors, city managers, police chiefs, school superintendents, business leaders, religious leaders, or heads of social service agencies) and coalition members attend a series of six workshops over 9 to 15 months to learn how to implement the CTC system. In these workshops, community leaders and CTC coalition members learn to use survey and public record data to identify and prioritize widespread risks in the community for youth substance use and delinquency; set clear, measurable, and achievable goals to reduce widespread risks and the incidence and prevalence of behavioral health problems community wide; select and implement tested and effective prevention programs that address their priority risk and protective factors; monitor the community's prevention system to ensure implementation fidelity of selected programs and policies; and monitor risk, protection, and behavioral health outcomes (Hallfors, Cho, Livert, & Kadushin, 2002; Hawkins, Catalano, & Arthur, 2002; Shapiro, Oesterle, Abbott, Arthur, & Hawkins). Research findings from the Community Youth Development Study (CYDS), a community-randomized trial of the CTC system in 24 communities (12 CTC and 12 control communities), found that CTC communities implemented CTC with fidelity (Fagan, Hanson, Hawkins, & Arthur, 2009), and implemented and sustained over time more tested and effective preventive interventions than control communities (Fagan, Arthur, Hanson, Briney, & Hawkins, 2011; Fagan, Hanson, Briney, & Hawkins, 2012). Coalition functioning was also found to be better sustained among CTC communities compared to control communities 20 months after study funding, training, and technical assistance ended (Gloppen, Arthur, Hawkins, & Shapiro, 2012). Further, at both 1.5 years and 4.5 years after implementation of CTC began, leaders from CTC communities reported significantly higher stages of a science-based approach to prevention than control community leaders during the initial 5-year implementation phase during which CTC communities received technical assistance and financial support from the study (Brown, Hawkins, Arthur, Briney, & Abbott, 2007; Brown et al., 2011). Although CTC communities did receive some training related to sustaining CTC during the Community Plan Implementation training at the start of phase 5 (Hawkins, Catalano, et al., 2008), no additional training or support was provided once the 5-year implementation phase was over. However, leaders in CTC communities continued to report higher stages of a science-based approach to prevention compared to leaders in control communities also during the following unsupported sustainability period (1.5 years after study technical support and funding from the study for CTC implementation ended) (Rhew, Brown, Hawkins, & Briney, 2013).

Data collected during the same period from a panel of youth followed from Grade 5 to Grade 10 in all 24 communities showed that initiation of delinquent behavior and alcohol and tobacco use, as well as current prevalence of these behaviors, were significantly lower among youth in CTC communities compared to those in control communities (Hawkins, Brown, et al., 2008; Hawkins, Oesterle, Brown, Abbott, & Catalano, In Press; Hawkins et al., 2009). Communities that had achieved higher stages of a science-based approach to prevention (according to key leaders) had significantly lower levels of adolescent problem behaviors at the end of eighth grade (as reported by the youths themselves), and this

relationship fully explained the observed lower prevalence of youth behavioral health problems in CTC compared to control communities (Brown et al., 2013). This finding suggests that sustaining the adoption of science-based prevention in communities could be an important mechanism for sustaining better youth behavioral health outcomes community wide.

The current study used key informant survey methodology to measure the perceptions of diverse community leaders about the prevention systems in their communities. The study assessed whether CTC communities continued to report higher levels of adoption of science-based prevention than control community leaders 3 years after study support for CTC implementation ended and 7 years after training to use CTC was provided. We also examined whether leaders in CTC communities who received CTC training reported higher levels of adoption of science-based prevention than leaders in those communities who did not receive CTC training. We hypothesized that those community leaders who attended any CTC training would better understand science-based prevention and report higher stages of adoption of science-based prevention in their community than leaders who did not receive CTC training.

Methods

In the CYDS, 12 pairs of free-standing incorporated towns in seven states (Colorado, Illinois, Kansas, Maine, Oregon, Utah, and Washington) were matched with regard to population size, poverty, ethnic and racial diversity, and crime indices. Communities within each matched pair were randomized to the intervention or control condition by coin toss (Hawkins, Catalano, et al., 2008). Additional detail on the selection of communities participating in CYDS is available elsewhere (Hawkins, Catalano, et al., 2008). Communities ranged in population from 1,400 to 45,000 according to 2000 U.S. census data ($M = 15,000$). CTC intervention activities began in summer 2003. Activities included trainings for community leaders from certified CTC trainers as well as technical assistance from CYDS staff. The study provided funding to CTC communities for hiring a CTC coordinator and for implementation of prevention programs. Technical assistance and funding ended after 5 years in the spring of 2008. Control communities received results from anonymous student surveys conducted in their communities, but no other resources, training, or technical assistance from the study.

Participants

The current study used data from the Community Key Informant Survey (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002) which was administered to key community leaders in 2001 (baseline), during the supported implementation phase in 2004 and 2007, and during the unsupported sustainability phase in 2009 and 2011. Participants were selected at each of the five waves using a 2-stage approach. First, community leaders from each of 10 service sectors were identified and selected for participation. These *positional leaders* included mayors, city managers, police chiefs, school superintendents, business leaders, religious leaders, or heads of social service agencies. Second, each positional leader named two individuals they thought were knowledgeable about their community's prevention efforts. Of

these *referred leaders*, the five who were most frequently recommended in each community were interviewed. At each wave, between 334 and 354 community leaders responded (at least 90% of eligible leaders each wave), for a total of 1,041 participants who were surveyed at one or more waves (see Figure 2). About 40% of key leaders were surveyed in more than one wave. The 1-hour survey was administered by telephone and covered topics related to the community's characteristics and its approach to prevention. This study did not follow specific individuals, but rather interviewed leaders in specific positions and roles at each data collection point. We reasoned that people in these positions control resources and shape public opinion, and had their greatest influence on the extent of use of science-based prevention in a community when in these positions.

Measures

Adoption of a science-based approach to prevention—Adoption was measured by 21 items asking leaders about their knowledge of prevention science concepts and their community's use of epidemiological data, use of tested and effective prevention programs, and system monitoring. The items assessed respondents' awareness of a risk- and protective factor-focused approach to prevention planning in their community; knowledge of specific risk and protective factors; their perceptions of the community's adoption of a prevention approach focused on reducing risk and enhancing protection; and the use of survey or archival data to guide prioritization of specific risk and protective factors as targets for prevention. Stage of adoption was coded into 6 levels ranging from 0 to 5: (0) little or no awareness of prevention science concepts; (1) basic awareness of prevention science terminology and concepts; (2) attention to risk and protective factors in the community's prevention planning; (3) collection of epidemiological data on risk and protective factors to guide prevention planning; (4) selection and implementation of tested and effective preventive interventions to address prioritized risk and protective factors; and (5) continued collection of epidemiological data for program evaluation, system monitoring, and adjustment of prevention programming. Each stage builds on the previous stages (e.g. meeting criteria for Stage 4 also required meeting criteria for Stages 1 through 3). Because few community leaders' responses indicated that their community had reached Stages 2 or 3 in the later waves of the study, we collapsed these stages into a single category for analyses.

CTC training—In 2007, 2009, and 2011, key leaders in CTC communities were asked whether they had attended any CTC training. Based on this information, we grouped participants into those who ever received CTC training (coded 1) compared to those who never received CTC training (coded 0). We cross checked these data with training sign-in sheets and found no inconsistencies. Approximately 31% of key leaders in CTC communities attended at least one CTC training. Key leaders in control communities did not receive CTC training from the study.

Demographic information included the key leader's gender, age, level of education, years resided in the community, positional versus referred status, and the number of survey waves in which they participated (see Table 1 for the distribution of these characteristics in the 2011 sample). Community characteristics also were assessed using 2000 U.S. census data,

including population size, percentage of non-White residents, and percentage of residents living in poverty.

Statistical Analyses

To assess whether CTC communities maintained a higher stage of adoption of a science-based approach to prevention once the CTC implementation phase ended, we used key leader data from 2007 (the last year of implementation) and from 2009 and 2011, collected during the unsupported sustainability phase of the CYDS. To account for the nesting of multiple observations within individuals across time and multiple reporters within each community, 3-level hierarchical generalized linear models were estimated using HLM 6.08 to compare the stage of adoption of a science-based prevention approach reached in CTC compared to control communities as reported by community leaders (S.W. Raudenbush, Bryk, Cheong, & Congdon, 2004). The 3-level HGLM was a cumulative probability model (S.W. Raudenbush & Bryk, 2002) with a log link function to model the proportional odds of endorsing one of the five ordinal response options. Level 1 modeled the repeated observations across survey waves; Level 2 estimated differences due to key leader characteristics (gender, age, level of education, years resided in the community, positional versus referred status, and number of waves responded); and Level 3 modeled differences due to community characteristics, including intervention condition (coded control community = 0, CTC community = 1), community size, percentage of non-White residents, and percentage of residents living in poverty. This model partitioned the variance in outcomes across the three levels, and allowed for examination of the effects of CTC at the appropriate unit of randomization (i.e., communities). Because key leaders in control communities were not trained in CTC, the effect of receiving CTC training on achieved stage of science-based prevention was assessed in the 12 CTC communities only.

Results

Did CTC Communities Maintain a Higher Stage of Adoption Than Control Communities?

As reported elsewhere, at the end of the implementation phase in 2007, CTC community leaders were significantly more likely to report a higher stage of adoption than leaders in control communities (Brown et al., 2011). Figure 3 shows the adoption scores reported by community key leaders by year and intervention status. The mean adoption score reported by community leaders in CTC communities in 2007 was 3.0 (SD=2.0) compared to a mean adoption score of 1.4 (SD=2.0) reported by control community leaders. Comparing the slopes during the sustainability period (2007 to 2011), the change in log odds per wave was not significantly different for key leaders in CTC communities compared to those in control communities ($b = -0.532$, $SE = 0.24$, $p = 0.161$). Since CTC communities had a higher mean level of adoption overall, this indicated that leaders from CTC communities continued to maintain higher levels of adoption than leaders from control communities during the sustainability phase. In 2011, at the end of the examined period, CTC community leaders had a 4 times greater odds of reporting a 1-stage higher level of adoption than control key leaders ($OR = 4.00$; 95% CI: 2.51, 5.49), with a mean reported adoption score of 2.4 (SD=1.9) for CTC community leaders compared to 1.3 (SD=1.7) reported by control community leaders.

What Was the Effect of CTC Training on Sustained Adoption?

We hypothesized that those community leaders who received CTC training would be more knowledgeable about science-based prevention and report higher stages of adoption of science-based prevention in their communities than leaders who did not receive CTC training. Figure 4 shows that across the sustainability period from 2007 through 2011, key leaders in intervention communities who received CTC training reported higher stages of adoption than leaders who did not attend CTC training. The change in reported stages of adoption during this period did not differ by receipt of CTC training ($b=0.647$, $SE=0.33$, $p=0.05$), but in 2011, CTC leaders who had received training had almost 6 times higher odds of reporting a 1-stage higher level of adoption than those who did not receive training ($OR = 5.91$, 95% CI: 4.16, 7.65).

Discussion

Previous studies from the randomized trial of CTC showed that CTC implementation reduced prevalence and delayed initiation of youth problem behaviors, and that this improvement in youth outcomes was attributable to the adoption of a science-based prevention approach in CTC communities (Hawkins, Brown, et al., 2008; Hawkins et al., In Press; Hawkins et al., 2009). Prior studies also showed that CTC communities were able to maintain a higher stage of adoption of a science-based prevention approach compared to control communities not only during the supported implementation phase, but also 1.5 years after technical support and funding from the study had ended (Brown, Hawkins, Arthur, Abbott, & Van Horn, 2008; Rhew et al., 2013). This study provides evidence that adoption of a science-based approach to prevention was sustained by CTC communities 3 years after study funding, training, and technical assistance ended. This finding indicates that this important mechanism of CTC can be maintained to some degree without external support in real-world situations. It is also important to note the relatively high level of variability of reported levels of adoption by key leaders in CTC communities (ranging from 12.4% of CTC community leaders reporting stage zero in 2011 to 26.6% reporting stage 5 in the same year). This highlights that the measure of adoption used in this study was based on the perceptions of community leaders. However, we believe the key leaders' knowledge and perceptions of the community's prevention system is an important component of the adoption and sustainability of science-based prevention at the community level.

Furthermore, this study found that CTC training was an important mechanism for sustaining higher stages of adoption of science-based prevention after the supported intervention phase. While key leaders in CTC communities all reported higher adoption levels than leaders in control communities, leaders who attended CTC training reported higher levels of adoption at all waves than leaders in CTC communities who did not attend CTC training. This suggests that receiving training to use the CTC system is associated with sustained adoption of a science-based approach to prevention in communities. However, the fact that key leaders who received CTC training reported decreasing stages of adoption during the unsupported sustainability phase suggests that continued access to CTC training may be important for maintaining high levels of science-based prevention in communities. Making CTC trainings available beyond the initial round of trainings also may be useful for

community leaders who are new to their leadership positions and have not had the opportunity to attend initial CTC trainings in their communities. Continued opportunities for CTC training in the community also may be important for maintaining community-level improvements in youth behavior and health given that adoption of a science-based approach to prevention has been found to be a key mechanism by which CTC impacts youth outcomes (Brown et al., 2013).

This study had several limitations. The 24 participating communities were small- to moderate-sized incorporated towns, so these results may not be generalizable to larger urban or suburban communities. Second, because data were reported by community positional and referred leaders, some of whom were members of the CTC coalitions, there may be some social desirability bias in the reporting. However, given the decrease in overall levels of adoption over time and the sustained differences between CTC and control communities observed 3 years after funding ended, results likely reflected actual differences in the perceptions and norms of key leaders. Third, the finding that community members who participated in the CTC trainings reported higher levels of adoption compared to those community members who did not receive trainings may be limited by the fact that community members “self-select” to receive the trainings and may have had greater interest in prevention initiatives prior to CTC implementation than those who did not chose to participate in the trainings. However, this is the situation that is experienced typically in communities; that is, prevention coalition formation and development is dependent on a high level of involvement in community activities by its members, and CTC trainings capitalize on this interest by directing their interest toward a science-based approach to preventing youth health and behavior problems.

This study indicated that CTC had sustained effects on levels of adoption of a science-based approach to prevention 3 years after study support ended. In addition, the study showed that training to use the CTC prevention system helped sustain adoption as reported by community key leaders. This suggests that making CTC trainings more easily accessible and continuously available to communities might improve adoption levels and help sustain high levels of adoption over time. Sustaining higher adoption of a science-based approach to prevention should lead to community-level improvements in behavioral health outcomes for youth.

Acknowledgments

Grant Number:

The grant number is R01DA015183.

References

- Arthur, MW.; Glaser, RR.; Hawkins, JD. Steps towards community-level resilience: Community adoption of science-based prevention programming. In: Peters, RDV.; Leadbeater, B.; McMahan, R.J., editors. *Resilience in Children, Families, and Communities: Linking Context to Practice and Policy*. New York, NY: Kluwer Academic/Plenum; 2005. p. 177-194.

- Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors: The Communities That Care Youth Survey. *Evaluation Review*. 2002; 26(6):575–601. [PubMed: 12465571]
- Brown EC, Hawkins JD, Arthur MW, Abbott RD, Van Horn ML. Multilevel analysis of a measure of community prevention collaboration. *American Journal of Community Psychology*. 2008; 41:115–126. [PubMed: 18176839]
- Brown EC, Hawkins JD, Arthur MW, Briney JS, Abbott RD. Effects of Communities That Care on prevention services systems: Outcomes from the Community Youth Development Study at 1.5 years. *Prevention Science*. 2007; 8:180–191. [PubMed: 17602298]
- Brown EC, Hawkins JD, Arthur MW, Briney JS, Fagan AA. Prevention service system transformation using Communities That Care. *Journal of Community Psychology*. 2011; 39(2):183–201. [PubMed: 23606774]
- Brown EC, Hawkins JD, Rhew IC, Shapiro VB, Abbott RD, Oesterle S, Catalano RF. Prevention system mediation of Communities That Care effects on youth outcomes. *Prevention Science*, Advance online publication. 2013; doi: 10.1007/s11121-013-0413-7
- Fagan AA, Arthur MW, Hanson K, Briney JS, Hawkins JD. Effects of Communities That Care on the adoption and implementation fidelity of evidence-based prevention programs in communities: Results from a randomized controlled trial. *Prevention Science*. 2011; 12:223–234. [PubMed: 21667142]
- Fagan AA, Hanson K, Briney JS, Hawkins JD. Sustaining the utilization and high quality implementation of tested and effective prevention programs using the Communities That Care prevention system. *American Journal of Community Psychology*. 2012; 49:365–377. [PubMed: 21809149]
- Fagan AA, Hanson K, Hawkins JD, Arthur MW. Translational research in action: Implementation of the Communities that Care prevention system in 12 communities. *Journal of Community Psychology*. 2009; 37(7):809–829. [PubMed: 22121303]
- Gloppen KM, Arthur MW, Hawkins JD, Shapiro VB. Sustainability of the Communities That Care prevention system by coalitions participating in the Community Youth Development Study. *Journal of Adolescent Health*. 2012; 51:259–264. [PubMed: 22921136]
- Hallfors D, Cho H, Livert D, Kadushin C. Fighting back against substance use: Are community coalitions winning? *American Journal of Preventive Medicine*. 2002; 23(4):237–245. [PubMed: 12406477]
- Hawkins JD, Brown EC, Oesterle S, Arthur MW, Abbott RD, Catalano RF. Early effects of Communities That Care on targeted risks and initiation of delinquent behavior and substance use. *Journal of Adolescent Health*. 2008; 43(1):15–22. [PubMed: 18565433]
- Hawkins JD.; Catalano RF. *Communities That Care: Action for Drug Abuse Prevention*. San Francisco, CA: Jossey-Bass; 1992.
- Hawkins JD, Catalano RF, Arthur MW. Promoting science-based prevention in communities. *Addictive Behaviors*. 2002; 27:951–976. [PubMed: 12369478]
- Hawkins JD, Catalano RF, Arthur MW, Egan E. Testing Communities That Care: The rationale, design and behavioral baseline equivalence of the Community Youth Development Study. *Prevention Science*. 2008; 9(3):178–190. [PubMed: 18516681]
- Hawkins JD, Oesterle S, Brown EC, Abbott RD, Catalano RF. Youth problem behaviors eight years after implementing the Communities That Care prevention system in a randomized trial. *JAMA Pediatrics*. In Press.
- Hawkins JD, Oesterle S, Brown EC, Arthur MW, Abbott RD, Fagan AA, Catalano RF. Results of a type 2 translational research trial to prevent adolescent drug use and delinquency: A test of Communities That Care. *Archives of Pediatrics and Adolescent Medicine*. 2009; 163(9):789–798. [PubMed: 19736331]
- Kerner J, Rimer B, Emmons K. Dissemination research and research dissemination: How can we close the gap? *Health Psychology*. 2005; 24(5):4.
- Mihalic, S.; Fagan, AA.; Irwin, K.; Ballard, D.; Elliott, D. *Blueprints for Violence Prevention*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention; 2004.

- Raudenbush, SW.; Bryk, AS. Hierarchical Linear Models. Second. Thousand Oaks: Sage Publications; 2002.
- Raudenbush SW, Bryk AS, Cheong YF, Congdon RT. HLM 6: Hierarchical Linear and Nonlinear Modeling. 2004
- Rhew IC, Brown EC, Hawkins JD, Briney JS. Sustained effects of the Communities That Care System on prevention service system transformation. *American Journal of Public Health*. 2013; 103(3): 529–535. [PubMed: 22720764]
- Shapiro VB, Oesterle S, Abbott RD, Arthur MW, Hawkins JD. Measuring dimensions of coalition functioning for effective and participatory community practice. *Social Work Research*. In Press.
- Substance Abuse and Mental Health Services Administration. National Registry of Evidence-based Programs and Practices. 2013. Retrieved August 10, 2013, from <http://www.nrepp.samhsa.gov/Index.aspx>
- U.S. Department of Health and Human Services. Healthy People 2020 Adolescent Health Objectives. Healthy People 2020. 2013. Retrieved August 10, 2013, from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=2>

Figure 1.
Theoretical model of Communities That Care prevention system transformation.

Figure 2.
Consort diagram of communities and participants in the randomized trial–Community Youth Development Study, 2011

Figure 3.
Key leader reports of stage of science-based prevention in CTC and control communities overtime.

Figure 4.
Stage of science-based prevention in CTC communities over time as reported by key leaders with and without CTC training.

Table 1

Community Key Leader Characteristics by Intervention Condition: Community Youth Development Study, 2011

Characteristic	Control	Intervention
	Number (%) or Mean $\pm$ SD	Number (%) or Mean $\pm$ SD
Participants	521 (50.0)	520 (50.0)
# of waves responded		
1	330 (63.3)	301 (57.9)
2	114 (21.9)	128 (24.6)
3	40 (7.7)	68 (13.1)
4	16 (3.1)	11 (2.1)
5	21 (4.0)	12 (2.3)
Year participated		
2001	176 (33.8)	178 (34.2)
2004	169 (32.4)	171 (32.9)
2007	164 (31.5)	172 (33.1)
2009	173 (33.2)	175 (33.7)
2011	165 (31.7)	169 (32.5)
Referred (2011)	52 (31.5)	55 (32.5)
Female	230 (44.1)	210 (40.4)
Age, year	50.0 $\pm$ 10.5	49.6 $\pm$ 10.9
Years lived in community	16.3 $\pm$ 17.7	16.8 $\pm$ 17.6
Bachelor's degree	244 (46.8)	235 (45.2)