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Variation in the Effect of Communities That Care on Community Adoption of a Scientific Approach to Prevention

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Abstract

Tested and effective approaches are available to prevent mental, emotional, and behavioral problems in youth, but such approaches are underused. Communities That Care (CTC) is a coalition-based strategy that aims to increase the use of tested and effective programs by combining the use of scientific evidence and stakeholder consensus to support the community adoption of a scientific approach to preventing mental, emotional, and behavioral problems in youth. A community-randomized trial of CTC was conducted with a sample of 24 communities matched in pairs and assigned randomly to a control or an intervention condition. The findings demonstrate that CTC significantly increases the community-wide adoption of a science-based approach to prevention. Using a meta-analysis technique, this study shows that despite uniformly high-fidelity implementation of CTC in intervention communities, the effect of CTC on the adoption of a scientific approach to prevention varies significantly across the 12 community pairs. Understanding the extent of variation in the effect of CTC on adopting a science-based approach to prevention lays a foundation for identifying aspects of coalition structure, functioning, or capacity that not only may help explain variation in adoption, but may in turn be targeted to strengthen the effect of CTC on the adoption of a science-based approach to prevention within communities.

Keywords

Communities That Care; coalition; intervention research; prevention; evidence-based practice

Estimates of the prevalence of mental, emotional, and behavioral disorders among youth (aged 12 to 17 years) in the United States range from 14% to 20% of the nation's youth population (Kessler et al., 1994; O'Connell, Boat, & Warner, 2009). The presence of these disorders diminishes the likelihood of a young person achieving important developmental and social milestones of adolescence, which in turn predicts undesirable outcomes in

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adulthood (Beauchaine & Hinshaw, 2008). The costs associated with mental, emotional, and behavioral disorders as well as their consequences create a burden on societal resources of roughly \$247 billion annually within the United States (O'Connell et al., 2009). These costs reach far beyond the realm of mental health care, and exert strain on systems of physical health care, education, law enforcement, justice, child welfare, and public assistance.

Three decades of research have not only identified predictors of mental, emotional, and behavioral problems in youth, but have also identified approaches that are effective for intervening with some of these predictors before problems occur. Approaches that have been tested and found to be effective are now available to reduce the onset, persistence, and severity of many psychological disorders, drug abuse, and delinquency in children and youth (O'Connell et al., 2009). Despite the availability of these tested and effective interventions (hereafter, *tested/effective*), prevalence rates of youth mental, emotional, and behavioral problems remain high, in part because tested/effective prevention interventions are not widely used. For example, although 82% of schools report attempts to prevent substance use among their students, only 27% of schools report using a tested/effective approach shown to have reliable effects on substance use (Ringwalt et al., 2009). Increasing the use of tested/effective prevention practices is a critical public health imperative (O'Connell et al., 2009).

Strategies to promote the prevention of mental, emotional, and behavioral problems in communities tend to focus on (a) identifying tested/effective programs and policies for dissemination, or (b) developing community coalitions to mobilize the support and energy of community stakeholders for prevention efforts (Layde et al., 2012). Either approach is limited if used in isolation. Creating inventories of tested/effective prevention strategies is a necessary step, but such inventories are ultimately insufficient to ensure the adoption of effective prevention practices in communities. As noted by a National Institute of Mental Health (NIMH) advisory group, “simply creating an inventory of evidence-based treatments will not result in their broad implementation” (NIMH, 2006, p. 7). On the other hand, recent reviews and empirical studies have reported that although many well-intentioned and well-funded consensus-based mobilization approaches have reported success in starting new programs, those programs failed to achieve their intended impact on the mental, emotional, and behavioral problems of young people in communities (Chervin et al., 2005; Collins, Johnson, & Becker, 2007; Hallfors, Cho, Livert, & Kadushin, 2002; Roussos & Fawcett, 2000; Yin, Kaftarian, Yu, & Jansen, 1997). Given the range of methods used, each study needs to be interpreted with appropriate cautions; however, the lack of effect detected from the use of consensus-based approaches has prompted speculation that stakeholders are unintentionally choosing prevention strategies that do not work (Glantz & Compton, 2004). A more successful strategy for facilitating the adoption of effective practices for the prevention of youth mental, emotional, and behavioral problems might be to combine evidence-based and stakeholder-consensus strategies, which would make use of both technical and local knowledge in concert. Communities That Care is a “prevention service delivery system” that combines the use of evidence and stakeholder consensus for prevention planning (Hawkins, Catalano, & Associates, 1992; Wandersman et al., 2008).

Communities That Care

Communities That Care (CTC) is a coalition-based strategy that combines evidence and stakeholder consensus to support a community's use of a scientific approach to local prevention. The CTC strategy is implemented in a community through a 5-phase process. During Phase 1, community stakeholders decide the scope of the prevention effort, ensure there is general support within the community for collaboration and science-based prevention, and address any community readiness issues. During Phase 2 of CTC, community leaders (e.g., mayor, school superintendent, police chief) are given a brief

orientation to a science-based prevention approach, including the strategy of using epidemiological data on risk and protective factors to guide the selection and implementation of tested/effective prevention strategies (Coie et al., 1993). Community leaders then recruit members to serve on a community coalition that will implement a science-based approach to prevention. This type of community coalition is “an organization of diverse interest groups that combine their human and material resources to effect a specific change the members are unable to bring about independently” (Brown, 1984, p. 4). CTC coalitions bring together diverse stakeholders from different sectors and vantage points to share knowledge and resources in their effort to collectively address mental, emotional, and behavioral problems. A coalition is a particularly useful infrastructure for community prevention work. Because many mental, emotional, and behavioral problems share common predictors (Biglan, Brennan, Foster, & Holder, 2004; Monahan, Hawkins, & Abbott, 2013), coalition-based community planning can address risk and protective factors without contributing to service redundancies or overlooking gaps (Hawkins, Shapiro, & Fagan, 2010). A coalition is also an appropriate infrastructure for launching a novel public initiative because a coalition (a) explicitly calls attention to the requisite need for widespread support and (b) enables communities to innovate and respond to changing conditions more readily than if the initiative were embedded within an entrenched organization (Butterfoss, Goodman, & Wandersman, 1993). CTC coalition members typically include parents; youth; advocates; residents; local business owners; elected officials; religious leaders; philanthropists; media representatives; and professionals from education, public health, juvenile justice, law enforcement, child welfare, and youth recreation sectors. Coalition members receive training and technical assistance to identify a guiding vision for their work, to formalize the structure and operating procedures of the coalition, and to develop the individual and organizational capacities needed to accomplish their vision (Quinby et al., 2008). The coalition takes responsibility for CTC implementation.

The third phase of CTC implementation involves coalition members collecting epidemiological data from youth in the community and surveying community resources to obtain the local information needed to guide informed decisions. The instruments used to collect information from all public school students in Grades 6, 8, 10, and 12 provide reliable and valid population-level estimates of the prevalence of preventable mental, emotional, and behavioral problems, as well as the risk and protective factors identified by research as predictors of these outcomes (Arthur et al., 2007; Glaser, Van Horn, Arthur, Hawkins, & Catalano, 2005).

In Phase 4, coalition members consider local values, priorities, and constraints; review survey data to prioritize the elevated risk factors and suppressed protective factors that the coalition wishes to target; and create an action plan for improving the local risk and protective factor profile of their community. Elements of the action plan are selected from programs and policies previously tested and demonstrated to be effective in changing the targeted risk and protective factors related to problem behaviors; these tested programs are detailed in the *CTC Prevention Strategies Guide* (Substance Abuse and Mental Health Services Administration, 2005). In the final phase of CTC, the coalition implements their selected programs and policies, ensures and maintains the implementation quality of those programs and policies, and regularly monitors data to ensure the programs and policies remain relevant and effective.

Each phase of CTC helps the local coalition apply scientific knowledge and processes to community planning while encouraging coalition members to determine how the science should be applied to their specific context. CTC was placed in the public domain by the Center for Substance Abuse Prevention of the federal Substance Abuse and Mental Health

Services Administration. All materials for CTC are available on the Internet (<http://www.communitiesthatcare.net>).

Underuse of effective prevention practices was the impetus for the creation of CTC as a prevention service delivery system (Hawkins et al., 2008). CTC is presumed to affect community levels of mental, emotional, and behavioral problems by first helping community leaders to adopt a scientific approach to prevention, which in turn, changes the way in which community-wide prevention service planning and provision is conducted. Therefore, it is important to assess the impact of CTC on a community's use of a science-based approach to prevention. A community-randomized controlled trial of CTC has tested this hypothesized theory of change by using surveys of community leaders to measure the extent to which a community is using a science-based approach to prevention (Brown, Hawkins, Arthur, Briney, & Abbott, 2007). The findings showed that at 1.5 years after the CTC intervention was implemented, the CTC communities had adopted a science-based approach to prevention to a significantly greater extent than the control communities. Specifically, the findings showed the control communities remained at early stages of adoption, largely characterized by knowledge acquisition, whereas the CTC communities reported significantly more community use of prevention science concepts to guide prevention practice.

What remains unknown is whether some CTC communities adopt a scientific approach to prevention to a greater extent than other CTC communities. Although all CTC coalitions in the community-randomized control trial implemented the CTC prevention delivery system with high fidelity to the CTC model (Arthur, Hawkins, Brown, Briney, & Oesterle, 2010; Fagan, Hanson, Hawkins, & Arthur, 2009), some CTC communities might have been more successful in achieving intermediate outcomes (e.g., community adoption of a science-based approach to prevention). Some researchers have hypothesized that communities could achieve varying levels of intermediate success because of the ways in which their coalitions were structured, the way each coalition functioned as a team, or the way in which coalitions developed member or organizational capacities (Allen, Watt, & Hess, 2008; Florin, Mitchell, & Stevenson, 1993; Roussos & Fawcett, 2000). The current study aims to determine whether the effect of CTC on community-wide adoption of a science-based approach to prevention varies significantly across communities. If variance is found, it will be important to understand the sources of this variation. Once the sources of variation are understood, future studies might be able to identify modifiable factors and conditions that could improve coalition capacity to promote community adoption and implementation of a scientific approach to prevention.

Method

The Community Youth Development Study (CYDS), the source of the data for this analysis, was approved by the Institutional Review Board at the University of Washington. Communities in the CYDS were identified originally by drug abuse prevention agencies in the states of Colorado, Illinois, Kansas, Maine, Oregon, Utah, and Washington (Arthur, Glaser, & Hawkins, 2005), and were matched into pairs by the following criteria: state, population size, racial/ethnic diversity, economic indicators, and crime rates. At baseline, the communities within each pair did not differ in youth problem behavior (Brown, Graham, Hawkins, Arthur, & Baldwin, 2009; Hawkins et al., 2008), and most central for the purpose of this study, the paired communities did not differ on their use of a science-based approach to prevention (Arthur, Ayers, Graham, & Hawkins, 2003). Consent to participate in the study was obtained from mayors or town managers, police chiefs, and school superintendents. After obtaining consent from 24 communities, one community from each matched pair was randomly assigned by a coin toss to the CTC or control condition,

providing 12 experimental comparisons between CTC and control communities. The CYDS matched-pair randomization process permits the use of meta-analytic procedures to calculate differences in the effect sizes between matched community pairs (Monahan et al., 2013). CTC was implemented with technical support from intervention specialists at the University of Washington for 5 years (2004–2008). The control communities conducted “prevention as usual,” which typically included coalition-based approaches, but did not necessarily include the components of the CTC approach. The current analysis examined how the sampled communities differed regarding their adoption of a science-based approach to prevention 1.5 years into the CTC implementation process. The 1.5-year time was important because within that period CTC communities were expected to have reached certain benchmarks. These benchmark activities included collecting epidemiological data from community youth and survey of community resources, prioritizing the elevated risk factors and suppressed protective factors that the coalition wished to target, and creating an action plan for improving the local risk and protective factor profile of their community.

Sample

The communities in the CYDS are incorporated towns within the United States with clear boundaries and their own governments, law enforcement agencies, and local schools. Each is a small to moderate-sized town with population sizes ranging from 1,578 to 40,787 persons, with the percentage of White residents ranging from 64% to 98.2%. In each of the 24 communities in the study, community leaders were the informants whose scores were aggregated to indicate the extent to which their community used a scientific approach to prevention. Individuals who held formal leadership positions (e.g., mayors, city managers, police chiefs, school superintendents, business leaders, and heads of social service agencies) were identified and surveyed as *positional leaders*, in 11 different community sectors, in all communities where the position existed. Each positional leader was then asked to identify two individuals in the community thought to be the most knowledgeable about current prevention efforts in the community. Of the people most often identified in each community, five people per community were surveyed as *referred leaders*. This sampling strategy yielded 354 community leaders, of whom 340 (96%) participated. Of the 340 respondents, 5 (1.5%) were dropped because the respondents did not provide adequate information to generate an adoption score. This deletion yielded 335 complete surveys (ranging from 13 to 15 per community) across both CTC and comparison communities 1.5 years after implementation of CTC had begun (Brown et al., 2007). The final sample of leaders averaged 49 years in age, was majority male (67%), consisted primarily of positional leaders (67%), was highly educated (48% held graduate degrees), and lived in the community for an average of 18 years. Leaders did not differ significantly across intervention status by age, gender, positional versus referred status, level of education, length of time living in the community, or the community sector the leaders represented (Brown et al., 2007).

Measures

The Community Key Informant Survey (Arthur et al., 2005) was used to collect data from community leaders in all 24 communities in 2001 (about 1.5 years before CTC implementation) and in 2004 (about 1.5 years after CTC implementation had begun). The survey was conducted using computer-assisted telephone interviews that typically lasted an hour. This survey is not CTC specific, but rather uses generic language to assess the extent to which leaders report that their communities are using a science-based approach to prevention (e.g., “Did your community prioritize risk and protective factors that you wanted to address with prevention activities?”).

The measure of adoption of a science-based approach to prevention is conceptually based on a diffusion of innovation metric (Arthur et al., 2005; Davis, Peterson, Helfrich, &

Cunningham-Sabo, 2007; Rogers, 2003). An adoption score of 0 indicates little or no awareness of prevention science concepts such as risk and protective factors and their relevance to prevention programming. A score of 1 indicates awareness of risk- and protection-focused prevention, but no indication of a community decision to use these concepts to guide prevention programming. A score of 2 indicates that the community is seeking to reduce risks for mental, emotional, and behavioral problems but does not collect epidemiologic data to guide the selection of prevention activities in the community. A score of 3 indicates that the community collects epidemiologic risk and protective factor data to guide prevention planning but does not use tested and effective preventive interventions. A score of 4 indicates that the community has developed a plan to use tested and effective preventive interventions to address prioritized risk and protective factors based on epidemiologic data collected in their community. Finally, a score of 5 indicates the implementation of tested and effective preventive interventions and ongoing assessments to monitor implementation and effects of the interventions (Arthur et al., 2005; Brown et al., 2007; Brown et al., 2013).

As described in detail by Arthur and colleagues (2005), adoption scores were generated for each leader based on the leader's responses to 22 closed-ended and open-ended questions, using item-level responses to determine the highest stage of adoption indicated, and averaged across leaders within communities. Previously reported psychometric analyses revealed intraclass correlations of .23 and .28 for positional leaders and referred leaders, respectively, indicating that a meaningful proportion of the total variance in respondents' ratings was the result of differences between communities. Reliabilities of adoption ratings (error variation around the mean community adoption scores) were reasonable; .75 for positional leaders and .71 for knowledgeable leaders. As expected, the community-level adoption scores correlated with the number of community leaders who had attended a training in science-based prevention, had seen manuals or other materials for the implementation of science-based prevention, and personally supported a science-based approach to prevention. On the other hand, community-wide adoption scores were unrelated to state mandates to adopt a science-based approach to prevention, unrelated to community leaders' assessment of the ease of understanding the approach, and unrelated to the extent of collaboration among community leaders. These analyses revealed the average adoption score was useful as a community-level construct to understand the community-wide adoption of a science-based approach to prevention.

Analysis Plan

Testing for significant variation in an intervention outcome, and determining the magnitude of such variation, requires the statistical estimation of a random effect because the effect of the intervention on an outcome can be different across communities. Modeling this estimation is a challenge with only 12 experimental communities within matched pairs. However, by using a meta-analysis technique, each pair of communities is viewed as a unique study, allowing us to calculate an overall effect by aggregating across the 12 studies. This meta-analytic technique is useful for testing the variance in an intervention effect for two primary reasons. First, the approach capitalizes on the community-randomized design of the trial by using the community pair as the level of analysis. Second, the approach has sufficient power to explore variance in intervention effects with only 12 matched community pairs (Monahan et al., 2013). This approach offers a further benefit when the researcher finds significant variation in the effect of CTC on the adoption of a science-based approach to prevention; in such cases, the meta-analytic approach allows the researcher to test the predictors of the variation that are observed only in the intervention communities. The present analyses used a meta-analytic approach to examine the extent to which the

effect of CTC on the community-wide adoption of a science-based approach to prevention varied across CTC communities.

Testing for variance in communities' adoption of a science-based approach to prevention requires two steps prior to the statistical estimation of the random effect. The first step involves calculating effect size differences in adoption scores between CTC and control communities within each of the 12 matched pairs. In the second step, the overall fixed effect is first estimated and then that estimate is used to perform a test that determines whether significant heterogeneity exists; thus, the estimation of a random effect is justified. In this study, the effect size for each community pair was calculated using the average level of adoption reported by leaders in each community. To generate the effect size estimates, we calculated the standardized mean differences in adoption scores by subtracting the average adoption score in each control community from the average adoption in its matched intervention community, and then dividing the difference by the pooled variance of each matched pair (Lipsey & Wilson, 2001). The pooled variance of each matched pair is the square root of the sum of the products of the *SD* and one less than the number of respondents within each community of the pair, divided by the total number of respondents within the matched pair. To account for the small sample of 12 community pairs, a Hedges Correction was applied to generate unbiased effect size estimates and confidence intervals for each pair (Hedges, 1981). Because individual respondents were nested within communities, we conducted sensitivity tests to determine if using the between-community variance component (generated through a two-level unconditional cumulative probability model in HLM 6.0; Raudenbush, Bryk, & Congdon, 2000) as an alternative to the pooled variance changed the interpretation of the results (Hedges, 2009). Given that no differences in interpretation were found, results are presented in the Cohen's *D* metric to preserve interpretability. Positive effect size values indicated that leaders in intervention communities reported higher levels of adoption of a science-based approach to prevention than did leaders in the matched control community.

Estimation of the overall effect was completed through the MEANES.SPS macro in SPSS v. 19 (Lipsey & Wilson, 2001). The weighted mean effect size was estimated to represent the overall difference in adoption scores between CTC and control communities across all matched pairs. Each unbiased effect size estimate was weighted by the inverse of its variance, such that matched pairs with larger numbers of respondents and smaller standard errors were weighted more heavily (Lipsey & Wilson, 2001). The confidence intervals for the mean effect size were based on the standard error of the mean. A critical value was used to determine statistical significance with a .05 Type I error rate.

From this model, the *Q* statistic was calculated to determine if there was significant heterogeneity in adoption scores between matched pairs that exceeded that which would be predicted by sampling error alone, the results of which could justify the estimation of a random effect model. *Q* was calculated using the formula:

$$Q = \sum w_i (ES_i - \overline{ES})^2,$$

where ES_i represents the individual effect size for each pair, $\overline{ES}$ is the weighted mean effect size across all pairs, and w_i is the weight for each individual effect size. The *Q* statistic is compared to the critical value of the chi-square distribution (X^2_{crit}) with degrees of freedom equal to one less than the number of effect size inputs (Lipsey & Wilson, 2001). Although the Cochrane Collaboration (the international standard bearer for the use of meta-analyses to improve population health) requires the *Q* statistic to be conveyed in their commissioned reports, the *Q* statistic has been criticized for creating a conservative test when less than 20

effect size comparisons are aggregated (Gavaghan, Moore, & McQuay, 2000). Therefore, a significant Q test in this study, which makes 12 comparisons, provides strong evidence for heterogeneity, while a nonsignificant result does not rule out heterogeneity (Higgins & Green, 2011). To supplement tests based on the Q statistic, the I^2 statistic is used to quantify the percentage of variability in the effect size estimates that was due to between-pair heterogeneity rather than sampling error. I^2 is computed by dividing the difference between Q and the test's degrees of freedom by Q, and multiplying the quotient by 100 (Higgins, Thompson, Deeks, & Altman, 2003). Standards for interpreting the I^2 statistic imply that an I^2 value of less than 30% represents mild heterogeneity, I^2 greater than or equal to 30% represents moderate heterogeneity, I^2 greater than or equal to 50% represents substantial heterogeneity, and I^2 greater than or equal to 75% represents considerable heterogeneity (Higgins & Green, 2011).

If significant heterogeneity is found through the estimation of a fixed effect model and the subsequent test of heterogeneity, the estimation of the random effect is justified, and the weighted mean effect is recalculated with a random effect to separate respondent-level from pair-level variation. The variance component derived from the fixed effect model is added as a constant to the variance of each effect size, and the inverse variance weights are recalculated and used to recalculate the weighted mean effect size. The weighted mean effect size generated through the random effects model, when justified, serves as the final estimation of the intervention effect.

Community leaders reported levels of adoption on an ordinal scale; however, our measurement procedure for understanding adoption at the community level was conceptualized using generalizability theory (Brennan, 2001). Based on this theory, the item-level responses aggregated across raters approximates an interval scale (Nunnally, 1978), thereby rendering the use of the standardized mean difference appropriate. To test this assumption, we also converted scores to a continuous log-odds metric based on a cumulative probability model, which were then averaged across leaders within each community to get a community-average log-odds of being at each stage of adoption. To determine whether explicitly transforming adoption scores produced different results, analyses were conducted using both the original community mean of observed scores and the log-transformed metric. Results from both analyses were similar and yielded no difference in substantive conclusions. For the ease of interpretation, all results are presented on the original observed score metric.

Results

The critical time point of interest in this study was 1.5 years after the implementation of CTC began, because it was hypothesized that intervention communities would reach several important benchmarks by this time point. At this time point, community adoption scores were assessed using a 0 to 5 scale, with higher scores indicating a greater extent of community adoption of science-based prevention. For intervention communities, community adoption scores ranged from 1.87 to 3.73 ($M = 2.80$, $SD = .55$), indicating that leaders typically reported that their communities were collecting epidemiological data on risk and protective factors, but were not consistently using tested and effective preventive interventions. In the control communities, community adoption scores ranged from 0.62 to 3.29 ($M = 1.69$, $SD = .79$), indicating that leaders typically were aware of prevention science concepts, but on average were not yet using science-based concepts to guide prevention efforts. In 6 of the 12 (50%) community pairs, the CTC community had significantly higher levels of adoption relative to its matched community (see Figure 1).

According to Cohen's (1988) criteria, these effect sizes were large, ranging from 0.89 to 2.02. In another five (33%) community pairs, the CTC community had higher levels of adoption relative to its matched community, but the difference did not reach statistical significance. Of these five communities, one effect size was negligible, three effect sizes were small, and one effect size was a medium effect. In a single community pair, the CTC community leaders reported lower levels of adoption of a science-based approach to prevention than community leaders in the control community reported, but the difference did not reach significance.

We estimated the overall fixed effect of CTC on adoption across the matched pairs, assuming variance between pairs was the result of sampling error within matched pairs. The overall effect size was $d = 0.72$ ($SE = .12$, $p < .001$). This finding indicates that, overall, the CTC communities had significantly higher levels of adoption as compared with controls; this finding is consistent with those of previous analyses using multilevel modeling (Brown et al., 2007). However, previous studies have not tested variance across matched community pairs. To determine whether there was significant variance between pairs in the effect of CTC on community adoption of a science-based approach to prevention, the Q test was examined. The results ($Q = 37.47$, $df = 11$, $p < .001$) indicate significant variation in adoption effect sizes between community pairs. The pair-level variance component accounted for 29% of the total variation in the adoption score, and the I^2 statistic was .71, indicating substantial heterogeneity in the effect.

Given the significant Q test and large I^2 statistic, we re-estimated the overall effect of CTC on community adoption of a science-based approach to prevention with a random effect, taking pair-level variance into account, and found an overall effect size of 0.78 (Cohen's d , $SE = .21$, $p < .001$). This result continues to suggest that experimental communities have significantly higher levels of adoption of a science-based approach to prevention as compared with control communities, consistent with prior findings (Brown et al., 2007). The effect size of 0.78 meets Cohen's criteria for a medium intervention effect. Further, the heterogeneity analysis showed the effect of CTC on community adoption of a science-based approach to prevention was not uniform across community pairs. Substantial heterogeneity was observed in the extent to which leaders in CTC communities reported the adoption of a science-based approach to prevention compared to leaders in matched control communities.

Discussion

This study indicates that a meta-analysis of effect sizes for each of 12 matched pairs yields findings consistent with previous results derived from multilevel modeling. At baseline, community leaders from CTC and control communities within matched pairs reported the same limited use of a scientific approach to prevention. However, 1.5 years after the implementation of CTC, leaders in CTC communities reported greater use of a science-based approach to prevention than the use levels reported by leaders in control communities. This difference between conditions was statistically significant and medium in size, indicating the reliability and magnitude of the effect of CTC on the community adoption of a scientific approach to prevention. The size of the effect of CTC on the adoption of a science-based approach to prevention is within the top quartile of mean effect sizes found in the published literature of psychological, behavioral, and educational interventions (Lipsey & Wilson, 1993). However, the results of our study show that this effect was not uniform across community pairs. Reliable and substantial differences exist in the extent to which CTC communities adopted a science-based approach to community-wide prevention efforts. Some CTC communities made greater advances than others in integrating the scientific principles into community-wide prevention planning and practices.

Although all CTC coalitions in the randomized controlled trial successfully implemented CTC (Arthur et al., 2010; Fagan et al., 2009), leaders in these CTC communities did not report equivalent levels of community adoption of a science-based approach to prevention. Future research should examine the reasons why CTC has larger effects on community-wide adoption of a science-based approach to prevention in some communities than in others. One possible explanation is that qualitative differences exist in the way CTC was implemented in the experimental communities, which led to differential levels of community adoption of science-based prevention. Such differences might be revealed through examining the process and proximal outcomes of CTC implementation. Some predictors might include how well the coalition was structured and functioned, thus providing the context for building member and community capacities. Studying the context, conditions, and proximal outcomes of coalition work could help identify sources of the variation in the effect of CTC on community adoption of a science-based approach to prevention, and, ultimately, lead to improvements in the CTC system and the work of CTC coalitions (Allen et al., 2008; Florin, Mitchell, Stevenson, & Klein, 2000; Roussos & Fawcett, 2000). Although examining such characteristics of the CTC coalitions is beyond the scope of this article, this line of research is an important area to pursue given that our analysis found significant variation in the effect of CTC on community adoption of a science-based approach to prevention.

This study has several limitations and strengths that should be noted. Although using an analytic approach that requires the aggregation of individual leader responses to a community average is a limitation, we believe this approach also has benefits. We chose an analytic technique that has utility for intervention research not only because it makes use of comparison groups, but also because it can be used to predict variation in intervention outcomes based on characteristics that can only be observed in intervention communities. A second limitation stems from the study data; no data were collected from the 4% of leaders from our sampling frame that did not participate in the survey, inhibiting analysis of systematic differences between participants and nonparticipants. A strength of the study is that it used an experimental design with randomization, which is intended to distribute unobserved variables with the potential to confound the relationship between intervention and outcome equally between experimental and control conditions. However, even with randomization, we cannot be certain as to whether an unmeasured characteristic (i.e., community readiness) was more prevalent in one condition than the other. There could be between-intervention group dependencies that are not controlled for in these analyses. Finally, communities involved in the CTC trial were incorporated towns in the United States with relatively small populations with relatively large proportions of White residents. This study should be replicated in communities of greater diversity in population size and racial/ethnic composition to determine if the results generalize to other communities. On the other hand, this study explores the variability in the intervention effect across 12 different coalitions in seven U.S. states, which is an unusually diverse sample in community-based research. In addition, the data set and analysis strategy used in this study permits a stronger attribution of outcomes to the intervention than is often possible in community coalition research (Berkowitz, 2001). This data set allows the impact of coalition work to be assessed relative to randomly assigned control communities using representative samples of community leaders with high response rates.

The meta-analysis technique used in this article is an innovative approach to studying coalition effectiveness. This technique revealed a statistically significant effect size difference between intervention and control communities on the community use of a science-based approach to prevention as reported by community leaders. Moreover, this technique demonstrated that the overall effect was not uniform across intervention communities.

Using information collected from CTC coalition members in the CYDS to explore sources of the variance in the effect of CTC on the adoption of a science-based approach to prevention is an important next step to advance understanding of how coalitions can facilitate community adoption of science-based prevention approaches.

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Figure 1.
Effect size differences between CTC community and control community adoption of a science-based approach to prevention as estimated through a fixed effects model