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Designed Cultural Adaptation and Delivery Quality in Rural Substance Use Prevention: An Effectiveness Trial for the Keepin' it REAL Curriculum

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Designed Cultural Adaptation and Delivery Quality in Substance Use Prevention:

An Effectiveness Trial for the *keepin' it REAL* Curriculum

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Abstract

This study examined how cultural adaptation and delivery quality of the school-based intervention *keepin' it REAL* (kiR) influenced adolescent substance use. A total of 39 middle schools in rural communities of two states in the U.S. were randomly assigned to one of three conditions (i.e., control, urban non-adapted kiR, and rural adapted kiR). Data were adolescent self-reported lifetime substance use and trained observers' ratings of delivery quality from the video records. Observer ratings were re-coded into high and low quality to create four comparison groups (i.e., low/high delivery quality in urban kiR condition and low/high quality in rural kiR condition). Controlling for substance use report in 7th grade, findings compared 9th graders' ($N = 2,781$) lifetime alcohol, cigarette, marijuana, and chewing tobacco use. Mixed model analyses revealed that rural youth receiving the adapted rural curriculum reported significantly less cigarette use than rural youth in the control condition. Those in mismatched intervention (non-adopted urban condition) did not significantly differ from the control participants, but a significant difference was observed based on the delivery quality. Rural youth in the high-quality urban condition reported less marijuana use than rural youth in the low-quality urban condition. Research implications and future directions are discussed.

Keywords: School-based intervention, substance use, adolescents, implementation quality, cultural adaptation

Designed Cultural Adaptation and Delivery Quality in Substance Use Prevention:**An Effectiveness Trial for the *keepin' it REAL* Curriculum**

With substantial substance use among youth (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016), implementing effective prevention programming remains an important goal. However, there is considerable debate in the prevention community about how to implement these programs and no clear theoretical guidance to-date, particularly when taking programs to scale. While the goal of some is universal prevention, others argue that adaptation or modification of prevention programs for different cultural contexts is both inevitable and desirable (Castro, Barrera, & Martinez, 2004). More importantly, some scholars contend that resources for prevention science should be directed toward ensuring that evidence-based programs are implemented with the highest degree of fidelity (i.e., the degree to which an intervention is delivered as intended) (Elliot & Mihalic, 2004), with others insisting that fidelity be expanded to include the overall quality of the implementation (Berkel, Mauricio, Schoenfelder, & Sandler, 2011). These are not unrelated issues since at least some modifications from original design or “program drift” are due to a lack of cultural relevance (Barrera, Berkel, & Castro, 2017).

The current study examines these issues during the implementation of *keepin' it REAL* (kiR), a middle school substance use prevention curriculum that merits being “taken to scale” by virtue of its status as one of the few multicultural, evidence-base programs listed on websites such as Youth.gov (<http://youth.gov/content/keepin%E2%80%99-it-real>), CrimeSolutions.gov (<https://www.crimesolutions.gov/TopicDetails.aspx?ID=4#program>), and California Healthy Kids Resource Center (<https://www.californiahealthykids.org/>) as well as the recommendation of the U.S. Surgeon General's (2016) report on addiction (Murthy, 2016). The curriculum is based

on a model derived from Narrative Engagement Theory (Miller-Day & Hecht, 2013), the Principle of Cultural Grounding (Hecht & Krieger, 2006), and Social Emotional Learning Theory (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). The intervention is narrative in both content as well as delivery and was culturally grounded in youth cultures as well as the urban, multi-ethnic population of Phoenix, Arizona where two efficacy trials demonstrated effects on substance use (Hecht, Graham, & Elek, 2006; Marsiglia, Kulis, Yabiku, Nieri, & Coleman, 2011). The multicultural version of the curriculum proved more effective than culturally targeted versions (Hecht et al., 2006). Studies of other interventions, however, lead to the conclusion that cultural grounding may not have the same effect on all ethnic groups (Johnson et al., 2005). Discrepant findings suggest ongoing questions about adaptation that led to the design of the current group randomized trial to evaluate the effectiveness of the multicultural, urban (hereafter referred to as urban) version of kiR as well as a new, culturally adapted rural version of the program created for this study.

Designed Adaptation

The literature suggests that one of the primary reasons curricula get adapted is to fit local needs (for review, see Barrera et al., 2017). Implementers often feel that the generic curriculum does not match the needs of their audience and adapt for race/ethnicity, geography and other factors. Although there are risks inherent in the process of adaptation, there are also benefits including addressing local needs, increasing community ownership, and increasing cultural relevance (Botvin, 2004; Dusenbury, Brannigan, Falco, & Hansen, 2003). In some cases, adaptation is necessary due to the “mismatch effect” or programs that are implemented in populations that are very different than the group for which they were originally developed. Castro and colleagues argue that this mismatch threatens efficacy even when there is high

fidelity because messages tend to be more effective when they represent the culture of the target audience (Castro et al. 2004; Hecht et al., 2003). This might explain the finding that in schools with higher non-white populations, teachers are more likely to locally adapt prevention curricula developed for white audiences (Ringwalt, Vincus, Ennett, Johnson, & Rohrbach, 2004).

Although some prevention researchers believe that the need for and effectiveness of local adaptation may be over-stated (Elliot & Mihalic, 2004), others support balancing the need for program fidelity with a desire for local or cultural adaptation (Dusenbury et al. 2003; Ringwalt et al., 2004). However, despite general interest in adaptation among the prevention community (e.g., Baker et al. 2001; Barrera, Castro, & Steiker, 2011;; Castro et al., 2004; Lee, Altschul, & Mowbray, 2008) and a call for evaluation of “planned” adaptations (Pentz, 2004), there are few examples of programs that describe the process of adapting a program for a new intended audience. In one study, Botvin and colleagues (1989) report how they adapted a smoking prevention curriculum originally tested with predominantly white, suburban students for an urban, Hispanic population. A second example is Project Northland that was originally designed to prevent early-onset alcohol use among rural adolescents in Minnesota and was adapted for use with a multiethnic population in Chicago (Komro et al., 2008). The current study builds on the limitations of previous research by conceptualizing and examining planned or design adaptation.

One model of planned or designed adaptation is based on the Principle of Cultural Grounding (Hecht & Krieger, 2006). Culture is considered a prime factor in both curriculum development and adaptation indicating a perceived need for curricula that communicates a high degree of cultural sensitivity to its target audience (Hecht et al., 2003). Prevention literature is concerned with how to transport a curriculum to a new culture and this involves altering

superficial symbols (e.g., religious symbols, food) as well as more deeply held cultural rules, values, and practices (Castro et al., 2004).

The Principle of Cultural Grounding (Hecht & Kreiger, 2006) is a prevention approach based on communication competence (Spitzberg & Cupach, 1984) and Narrative Engagement Theory (Miller-Day & Hecht, 2013), as well as multiculturalism (Green, 1999). Cultural grounding argues that the prevention messages must be derived from and with cultural group members as active participants in message design and production. It invokes core values and communication styles as central features of a culture's deep structure that are expressed in narratives.

The grounding of kiR grew out of literature articulating an adolescent perspective (i.e., youth culture)—how adolescents make sense of drug offers, their norms and values, how they make decisions about use, and how they resist offers (Miller, Alberts, Hecht, Trost, & Krizek, 2000; Pettigrew, Miller-Day, Krieger, & Hecht, 2011). Characterized as a “from kids, through kids, to kids” approach, curriculum development started with cultural narratives and proceeded iteratively through participatory action research (Hecht & Miller-Day, 2009). The current study provides an evaluation of a new, rural version of the curriculum adapted from the urban version (see Colby et al., 2013) and allows for a comparison of both versions of the program against controls in rural schools to test the need for cultural adaptation.

Delivery Quality

As noted, culturally mismatched programs are more likely to be adapted during implementation giving rise to questions about whether effectiveness is driven by the mismatch or the quality of delivery. Regardless of whether adapted or not, the success of interventions may rest on the quality of their delivery because altering material may detract from program outcomes

(Botvin, 2004; Elliot & Mihalic, 2004). Unfortunately, when evidence-based programs are taken to scale, they are rarely implemented as designed (Elliot & Mihalic, 2004; Botvin et al., 1989; Miller-Day et al., 2013; Ringwalt et al., 2004).

Dusenbury et al. (2003) argue for conceptualizing implementation more globally under a construct we label delivery quality. This reflects a shift from viewing all change as maladaptive to asking a more global question of the quality of implementation with fidelity as one of many factors and perhaps not even the most important. Berkel et al. (2011) suggest a multidimensional view that includes both teacher and student behaviors and Pettigrew et al. (2015) report that delivery quality is a better predictor for program outcomes than merely adherence to the program. Findings like these suggest taking a broad and inclusive view toward delivery quality and that more research is needed to evaluate its importance. Thus, the current study aims to examine the relationship between delivery quality and program adaptation.

Hypotheses

We hypothesized that adapted curriculum that are well delivered will be more effective than those that are not adapted or are poorly delivered. Specifically, we examine the effects of delivery quality in the process of implementing the multicultural, urban kiR in a new, rural setting and comparing it to the implementation of a re-grounded (adapted) rural version of the kiR intervention. In accomplishing these goals, this study provides a test of the novel curriculum based on the principle of cultural grounding and narrative engagement theory while providing answers to questions about the most efficacious adaptation. The following hypotheses are posited:

H: There will be significant differences in substance use across the five conditions such that:

Ha: Participants in the high quality designed-adapted rural kiR will report less substance use than those in the control condition.

Hb: Participants in the low quality designed-adapted rural kiR will report less substance use than those in the control condition.

Hc: Participants in the high quality designed-adapted rural kiR will report less substance use than those in the low quality designed-adapted rural kiR condition.

Hd: Participants in the high quality non-adapted urban kiR will report less substance use than those in the control condition.

He: Participants in the low quality non-adapted urban kiR will report less substance use than those in the control condition.

Hf: Participants in the high quality non-adapted urban kiR will report less substance use than those in the low quality non-adapted urban kiR condition.

Methods

Participants and Procedures

Schools were recruited to participate from rural school districts in Pennsylvania and Ohio based on rural-urban classifications provided by the National Center for Education Statistics (<http://nces.ed.gov>). A total of 39 schools agreed to participate and were randomly assigned to the control condition ($n = 14$), the urban curriculum condition ($n = 11$), or the adapted rural curriculum ($n = 14$) (see Graham et al., 2014). Prior to implementation, treatment (urban and rural conditions) schools were provided curriculum materials and a standard one-day training. Control schools were provided information about study procedures and promised the urban or rural curriculum materials and training after the study ended.

Passive parental consent and active student assent were obtained to participate in four waves of self-report, paper-and-pencil surveys on computer-scannable forms administered by a university's survey research center. Survey data were collected in fall and spring of 7th grade (2009, 2010) and subsequently in spring of 8th (2011) and 9th grades (2012). Surveys followed a planned missing design due to time constraints (Graham, Hofer, & MacKinnon, 1996; Graham, Taylor, Olchowski, & Cumsille, 2006). All procedures were approved by a university institutional review board.

A total of 2781, 9th grade students ($M = 14.71$ years, $SD = .60$) participated including 1095 students in control condition (39.4%), 664 in the urban condition (23.9%), and 1022 in the rural condition (36.7%). Of the total, 51% reported themselves as male and 97% indicated as European American. Students' demographics matched the geographic location of data collection.

Designed Adaptation of kiR for Rural Youth

The urban kiR was "re-grounded" for rural schools (Colby et al., 2013). The urban focus of kiR as well as many, perhaps most, programs may mean that cultural mismatch is experienced when implemented in rural areas. Briefly, rural cultures differ from their urban and suburban counterparts in several important ways, including experiencing considerable health disparities (Haynes & Smedley, 1999). These disparities extend to substance use where rural adolescents report higher levels of tobacco, alcohol, and methamphetamines use than their non-rural counterparts (Warren, Smalley, & Barefoot, 2016) and often begin using drugs at an earlier age (Zollinger, Saywell, Overgaard, Przybylski, & Dutta-Bergman, 2006). Additional research suggests that protective factors, such as peer and parental disapproval, may be weaker among rural youth (Lenardson, Hartley, Gale, & Pearson, 2012). Formative research collected rural narratives about drug offers, identifying the complexities of rural drug offers/refusals processes

(Moreland, Raup-Krieger, Miller-Day, & Hecht, 2013; Pettigrew, Miller-Day, Kreiger, & Hecht, 2012). In collaboration with rural teachers, this information was integrated into the curriculum including role play activities, decision scenarios, and homework as well as new videos that retain the prevention strategy, curriculum design, and intervention strategy (for more detail, see Colby et al., 2013).

Measures

Both observational and self-report measures were used in this study. Observational measures were utilized to assess delivery quality and self-report measures were used to assess student outcomes. For this study used wave 1, pre-test data for the baseline controlling variables for student outcomes and wave 4, final post-test data collected 24 months after implementation.

Delivery Quality (Observations). To measure delivery quality, kiR lessons were videotaped and coded by three trained coders. Teachers in treatment schools were provided digital video cameras to record all lessons. Digital recordings were mailed to project staff. Teachers were compensated \$10 per lesson if they completed all research activities. This resulted in a corpus of 688, 20-60-minute videos. A random selection of 276 videos was analyzed including approximately four lessons per class. The first and last lessons were excluded to focus on lessons with the most prevention content (Pettigrew et al., 2013).

A team of three trained coders received twenty hours of coding training (see Pettigrew et al. 2015 for more detail). Five indicators of teacher engagement were rated on four-point scales measuring how attentive, enthusiastic, serious, clear, and positive the teacher was. Student engagement assessed the level of attentiveness and participation observed during the lesson on a four-point rating scale. A third dimension, global teaching quality or overall effectiveness, was rated on a five-point scale from poor to excellent. Weekly meetings were held and, monthly,

coders were randomly assigned the same video to re-check coding agreement. This process prevented coder drift and allowed coders to maintain consistent standards. Inter-coder reliability using the Krippendorff alpha (Hayes & Krippendorff, 2007) showed high agreement at four different time points during the coding process (0.94, 0.93, 0.84, and 0.92).

Teacher engagement, student engagement, and global teaching quality were combined into a single variable labeled delivery quality following Pettigrew et al. (2015). Each indicator was averaged from within-lesson ratings for each variable and then averaged across lessons producing a mean within-lesson rating for each unique class of students. We then computed delivery quality by calculating the mean of weighted standardized variable scores where teacher engagement was given twice the weight of student engagement and global teaching quality. Two factors determined our weighting calculus: videos were positioned in the backs of classrooms to focus on teachers while still capturing the entire class, and coders rated 6 items assessing teachers and only 2 assessing students (Pettigrew et al., 2015).

Substance Use (W1 & W4 Surveys). Four items measured youth lifetime use of alcohol, cigarette, marijuana, and chewing tobacco (Hansen & Graham, 1991). Students were asked to answer items, “How many drinks of alcohol have you had in your entire life” with 10 response options, “How many cigarettes have you smoked in your entire life” with 10 response options, “How many times have you used marijuana in your entire line” with 7 response options, “How many times have you used chewing tobacco in your entire life” with 8 response options. See Table 1 for descriptive statistics of substance use in five conditions.

Analytical Plan

Prior to the main analyses, multiple imputation (Graham, 2012) was employed to handle the data missingness by entering youth reports of lifetime substance use at W2 and W3 as

auxiliary variables, using Mplus (Muthén & Muthén, 2015). Next, prior to the analyses, four dummy variables were created to compare a reference group and the rest of the conditions. For example, the first analysis puts the control as the reference group and tests the comparisons between the reference group and the other four conditions. The second analysis uses the low quality urban condition as the reference group and compares the outcomes between the reference group and the other two conditions (e.g., control condition and high quality urban condition). In this way, we were able to compare all five conditions while controlling for school level effects and baseline substance use. To summarize, we tested the hypotheses by computing a series of mixed model analyses to examine the effects on youth substance use behavior (W4) while statistically controlling for school level effects and baseline (W1) pre-test reports of youth lifetime substance use.

Results

The hypotheses predicted that there would be significantly different effects on youth substance use across the five conditions. Mixed model analyses compared the high- and low-quality rural and urban conditions to the control condition (see Table 2). We found that youth in both high- and low-quality delivery of the rural conditions reported significantly less cigarette use than those in the control condition (Ha and Hb partially supported). All the other effects for high-quality rural intervention were in the desired direction but not statistically significant. Effects for low-quality rural were also in the desired direction for alcohol and chewing tobacco but essentially zero for marijuana and none were statistically significant. In addition, youth in the high-quality urban condition reported less marijuana use than those in the low quality urban condition (Hf partially supported) but neither high nor low quality urban interventions differed

significantly from the control group and all effects were near zero. The other hypotheses were not supported.

Overall, then, these analyses comparing high- and low-quality rural curricula mirror the findings for Ha and Hb above that generally support the effectiveness of the rural curriculum regardless of delivery quality.

Discussion

Findings from this study underscore the importance of both planned or “designed” adaptation and, secondarily delivery quality. Advancing knowledge in these two domains contributes new evidence in prevention science that can aid program developers and the prevention community as interventions are scaled. Findings also support the effectiveness of *keepin' it REAL* when it is culturally grounded but not when it is culturally mismatched. This section reviews the findings and explores their implications.

Designed Adaptation

The most significant finding was the emergence of designed adaptation as the key in generating positive program effects. The adapted, rural curriculum that matches the culture of the target audience proved effective in reducing adolescent cigarette use. A similar, but non-significant pattern was observed for alcohol, marijuana, and chewing tobacco. This general pattern was true regardless of delivery quality. Thus, the rural curriculum proved efficacious in reducing tobacco use in the culturally matched population. The same, however, cannot be said for the urban or culturally mismatched curriculum. While the high-quality implementation of this curriculum resulted in significantly less marijuana use than the low-quality delivery, neither differed significantly from the control group for any of the substances.

These findings support the importance of cultural re-grounding (Colby et al., 2013) when a curriculum is mismatched. Whether this means creating a new version of the curriculum as was done here (i.e., the rural version) or adapting the curriculum for the new population by including the culture in a multicultural design, the current findings suggest that even evidence-based practices can be ineffective when culturally mismatched. Pettigrew and Hecht (2015) argue that this process should be considered when developing prevention curricula, partly because it allows the voices of the target intervention group to be represented in the program. It also may explain why some culturally targeted evidence-based programs produce null effects when taken to new populations. If the voices of the new target culture are not represented in the program, the Principle of Cultural grounding (Hecht & Krieger, 2006) argues that the target population will not easily adopt or internalize these messages. As Colby et al. (2013) note, questions remain about the means for inclusion in multilevel, culturally situated community interventions, which requires consideration of core components and philosophies (see also Barrera et al., 2017). While cultural re-grounding appears successful, it is not necessarily easy and can be resource-intensive. As a potential solution, Miller et al. (2000) provided a “how-to” appendix for schools to develop their own prevention programs and Colby et al. (2013) provides an exemplar of this process.

A second strategy is to build dissemination into the initial design by making the curriculum truly multicultural. This means a curriculum that is inclusive rather than targeted to salient identities. The multicultural, urban curriculum was developed for Phoenix, Arizona schools and included youth, SES, gender as well as three ethnic cultures that represented over 95% of the local population (Mexican American, African American, White American). When this was adapted for national distribution by D.A.R.E. America, kiR was modified to include rural, suburban and urban adaptations (including allowing for mixing to accommodate contexts

that have elements that cut across geographic identities) along with an even greater range of ethnic identities (i.e., Asian Americans and other groups). We do not assume that all members of an identity group can be represented this way because there are likely to be small groups in certain sections of the country that do not identify with the represented groups (e.g., Vietnamese who do not identify if Chinese or Japanese Asians are represented; LGBTQ youth). However, we believe that inclusiveness fosters engagement. Thus, when students across the U.S. participate in D.A.R.E., which is in over 70% of school districts, most can see themselves represented.

Third, we argue that narrative pedagogy is a key to facilitate taking curriculum to scale. Even after including as many identity groups and cultural factors as possible in assembling a multicultural curriculum there may be other local factors that need to be considered. Narrative Engagement Theory (Miller-Day & Hecht, 2013) uses narrative pedagogy as a strategy for accommodating new settings. Using stories as exemplars, scenarios for activities, role plays, discussions, and other pedagogical tactics provides students and implementers with opportunities for localization while maintaining fidelity. During these activities participating youth provide their own narratives or stories, localizing the content as they apply it. This is particularly true when developmentally appropriate narratives are derived from youth culture to stimulate discussion and role plays. The theory argues that personal narratives emerge in response to these iconic narratives, which engages audiences and localizes the curriculum by allowing youth to “see themselves” even in a curriculum that does not directly address every aspect of their individual cultural identities. Thus, narrative pedagogy is an essential element of the curriculum plan to facilitate dissemination.

Delivery Quality

Perhaps the most surprising results was that delivery quality did not significantly influence students. We can speculate about why this was observed. For example, the effects of cultural matching may have overridden those of delivery. In other words, cultural matching is simply a more powerful predictor of prevention outcomes smoothing out or masking any delivery effects.

Thus, delivery quality remains an important topic of study and practice with many unanswered questions (for review, see Durlak & DuPre, 2008). Efforts should remain focused on either (a) developing prevention programs that are immune to low delivery quality (Bumbarger, 2015), such as adaptive interventions (Collins, Murphy, Bierman, 2004) or (b) selecting, training, and supporting high delivery quality (Fixen, Blasé, Naoom, & Wallace, 2009). While programs may never be totally immune to low quality delivery, programmed interventions and/or those online may minimize the threat. For example, REAL Prevention recently developed and implemented an e-learning curriculum that locks students into a progression through the lessons and informs instructors if students are not making progress. This program, and others like it, capitalize on emerging technologies for scaling interventions. Evaluations can provide evidence for the efficacy of this approach.

Trainer and training issue have long been discussed in the prevention literature, concluding that training matters (Fixen et al., 2005). What is less clear is how much and what kind of training and technical support. Some find training plus ongoing phone reminders and support improved outcomes (Kaner et al., 1999) whereas others found no effects from training plus coaching (Ringwalt et al., 2009). D.A.R.E. America provides extensive training, including a practicum, and ongoing technical support for their implementation of kiR. D.A.R.E. requires a minimum of 80 hours of training for new Officer instructors and provides a network of officer

mentors and educators to support their efforts. As a result, studies of Officer implementers demonstrate their fidelity and delivery quality (Bumbarger & Miller, 2007; Hammond et al., 2008). Unfortunately, little is known about training or technical support, other than acknowledging that training matters. Another option involves taking advantage of technology that allows user customization (i.e., the user makes choices in curriculum options to individualize the content) (Kang & Sundar, 2016) while retaining the overall prevention strategy.

Limitations

Although findings in this study shed light on the important topics of adaptation and implementation, results should be interpreted with caution. This study was conducted with youth in rural districts across two states in the U.S. who may not represent all rural youth in the country. Moreover, while the sample is similar to the local population characteristics, it does not include substantial numbers of rural minority populations and does not allow for subgroup analysis. The findings, therefore, may not generalize to the entire youth population in the United States.

Relatedly, the process of cultural grounded customized kiR to the experiences and narratives of rural youth and teachers. We then delivered the program in places defined as rural by National Education Statistics. While these are likely correlated concepts, it is reasonable to assume that there is heterogeneity in the degree to which youth living in rural places identify with rural life. To better understand effects of cultural mismatch, attention should be given to the interplay between the structural and phenomenological definitions of culture.

Overall Conclusions

The current study attempted to answer questions about the importance of designed adaptation and delivery quality for the widely disseminated, evidence-based *keepin' it REAL*

curriculum. In our study, only the rural version of the program adapted specifically for rural youth demonstrated effectiveness in reducing substance use and those results were limited to tobacco use. Given the important health effects of this substance, this finding should not be minimized and provides some support for the effectiveness of *keepin' it REAL* when adapted for local circumstances as well as, hopefully, for the nationally disseminated D.A.R.E. program that is more widely grounded in geographic, ethnic, gender, and other types of diversity.

At the same time, delivery quality did not provide the overall benefits reflected in previous research (Pettigrew et al., 2015). Further research is needed to determine if delivery quality is primarily protective or if delivery itself is a quality of effective interventions (i.e., improves effects of all curricula). One can even conceptualize a combination of these, protecting against iatrogenic effects of some curricula, increasing the effectiveness of moderately effective curricula, and having no effect on powerful curricula.

Based on this, we might ask, what classifies as a universal program? Questions remain about the key characteristics of a target population (i.e., what cultural features require re-grounding) and how these characteristics are defined (e.g., will a program developed in rural Pennsylvania and Ohio be effective in rural Maine? Rural California?). Do these transcend core components and clear logic models? Such questions about implementation science are important to consider and investigate as programs developed in one place are disseminated elsewhere. Prevention and implementation science that includes processes for taking programs to scale is in its infancy; we hope that this study demonstrates the complexity of these issues, raises relevant questions for future exploration, and shares some guidance in this process.

In conclusion, this study highlights the need for culturally re-grounding prevention curricula. The urban version of the *keepin' it REAL* curriculum that has proven effective in two

previous randomized clinical trials in an urban, multi-ethnic community, did not achieve the same effects when it was implemented in the largely white, rural settings of Ohio and Pennsylvania. The controversies around fidelity, implementation quality, universal prevention, cultural grounding/appropriateness, etc. are addressed, in part, by these findings that argue for regrounding curriculum and suggest that this process may be more important than implementation quality in achieving program effects. Greater attention to issues surrounding inclusion (i.e., multiculturalism) versus targeting are needed as we address the viability of universal prevention.

Beyond the more conceptual implications for prevention science, these findings demonstrate the need for further research in our under-served rural communities. Rural culture, like other cultural variables, merits consideration when interventions are designed and implemented. While the size of our rural populations may be less than they were even 30 years ago, a significant number of people still live in these cultures and others have likely retained a portion of their rural identities even after relocating to other geographic areas.

Compliance with Ethical Standards

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Conflict of Interest The authors declare a potential financial conflict of interest. Hecht and Miller-Day are co-founders of REAL Prevention, LLC—a business dedicated to training, research, and dissemination of keepin' it REAL and other allied health promotion programs—and hold intellectual property rights to keepin' it REAL curriculum. Pettigrew is a part-time consultant with REAL Prevention but was not remunerated for involvement with this project.

Ethical Approval All study procedures involving human participants were approved by the Penn State Institutional Review Board and in accordance with standards for ethical research practice, including the 1964 Helsinki declaration and its later amendments.

Informed Consent: Participants were informed of their rights and parental informed consent coupled with youth assent was obtained prior to any data collection.

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Table 1. Baseline (W1) and Lifetime Substance Use (W4) Substance Use Means and Standard Deviations

	High Quality in Rural Version	Low Quality in Rural Version	High Quality in Urban Version	Low Quality in Urban Version	Control Condition
W1 Alcohol	2.01 (SD = 1.40)	2.12 (SD = 1.60)	2.02 (SD = 1.44)	2.18 (SD = 1.60)	1.91(SD = 1.38)
Cigarette	1.31 (SD = 1.23)	1.40 (SD = 1.36)	1.44 (SD = 1.53)	1.38 (SD = 1.41)	1.22 (SD = .99)
Marijuana	1.04 (SD = .40)	1.06 (SD = .45)	1.05 (SD = .44)	1.03 (SD = .18)	1.02 (SD = .24)
Chew. Tobacco	1.17 (SD = .81)	1.16 (SD = .75)	1.18 (SD = .68)	1.29 (SD = 1.10)	1.27 (SD = 1.01)
W4 Alcohol	3.42 (SD = 2.50)	3.49 (SD = 2.59)	3.83 (SD = 2.61)	4.32 (SD = 3.07)	3.81 (SD = 2.88)
Cigarette	1.94 (SD = 2.18)	2.10 (SD = 2.43)	2.52 (SD = 2.80)	2.91 (SD = 3.22)	2.46 (SD = 2.76)
Marijuana	1.48 (SD = 1.34)	1.57 (SD = 1.52)	1.45 (SD = 1.24)	1.82 (SD = 1.81)	1.49 (SD = 1.36)
Chew. Tobacco	1.57 (SD = 1.63)	1.52 (SD = 1.51)	1.97 (SD = 2.10)	2.13 (SD = 2.24)	1.90 (SD = 2.06)

Table 2. Mixed Model Results

		High Quality in Rural Version (HR)	Low Quality in Rural Version (LR)	High Quality in Urban Version (HU)	Low Quality in Urban Version (LU)
Low Quality in Rural Version	Alcohol	-0.02 (0.04), p = 0.540			
	Cigarette	-0.04 (0.03), p = 0.288			
	Marijuana	-0.06 (0.03), p = 0.062			
	Chew. Tobacco	0.01 (0.04), p = 0.902			
Low Quality in Urban Version	Alcohol			-0.05 (0.06), p = 0.431	
	Cigarette			-0.07 (0.04), p = 0.139	
	Marijuana			-0.09 (0.03), p = 0.007	
	Chew. Tobacco			0.01 (0.05), p = 0.906	
Control Condition	Alcohol	-0.04 (0.03), p = 0.183	-0.04 (0.03), p = 0.193	-0.01 (0.03), p = 0.685	0.03 (0.04), p = 0.455
	Cigarette	-0.09 (0.02), p = 0.000	-0.06 (0.02), p = 0.009	-0.01 (0.02), p = 0.814	0.02 (0.04), p = 0.607
	Marijuana	-0.01 (0.02), p = 0.593	0.03 (0.03), p = 0.338	-0.02 (0.03), p = 0.367	0.05 (0.03), p = 0.165
	Chew. Tobacco	-0.04 (0.03), p = 0.269	-0.04 (0.03), p = 0.189	0.02 (0.03), p = 0.379	0.03 (0.03), p = 0.407

Note. A negative value in a cell means that the “better” group, that is, High quality implementation (vs. low quality implementation), or any treatment (vs. control) has lower substance use. A positive value in any cell signifies an iatrogenic effect.
Parameter (S.E), P Value