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Long-Term Effects of the *keepin' it REAL* Model Program in Mexico: Substance Use Trajectories of Guadalajara Middle School Students

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Abstract

In the face of rising rates of substance use among Mexican youth and rapidly narrowing gender differences in use, substance use prevention is an increasingly urgent priority for Mexico. Prevention interventions have been implemented in Mexico but few have been rigorously evaluated for effectiveness. This article presents the long term effects of a Mexico-based pilot study to test the feasibility of a linguistically specific (Mexican Spanish) adapted version of *keepin' it REAL*, a school-based substance abuse prevention model program. University affiliated researchers from Mexico and the US collaborated on the study design, program implementation, data collection, and analysis. Students and their teachers from two middle schools (secundarias) in Guadalajara participated in this field trial of *Mantente REAL* (translated to Spanish). The schools were randomly assigned to treatment and control conditions. The sample of 431 students reported last 30 day substance use at three times (one pretest and two posttests). Changes in substance use behaviors over time were examined using growth curve models. Long term desired intervention effects were found for alcohol and marijuana use but not for cigarettes. The intervention effects were greater for girls than for boys in slowing the typical developmental increase over time in alcohol use. Marijuana effects were based on small numbers of users and indicate a need for larger scale studies. These findings suggest that *keepin' it REAL* is a promising foundation for cultural program adaptation efforts to create efficacious school-based universal prevention interventions for middle school students in Mexico.

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Keywords

Substance use prevention; Drug resistance strategies; Feasibility trial; Mexico; Adolescents; Gender differences

Introduction

In Mexico, alcohol and other drug dependence is on the rise among adults (Medina-Mora et al., 2012; Villatoro-Velázquez et al., 2012). The prevention of early initiation and heavy substance use in adolescence is one important strategy to address increasing rates of alcohol and other drug dependence (Chen, Storr, & Anthony, 2009; Guttmannova et al., 2011). Like drug dependence among adults, rates of adolescent alcohol use in Mexico have increased 12 % since 2008. Over half (55 %) of adults living in Mexico report initiating alcohol use before age 18 (Medina-Mora et al., 2012). Compared to alcohol use, fewer adolescents report smoking tobacco regularly but over half have smoked at least one cigarette in their lifetime (OECD, 2011). Although rates of illicit substance use among adolescents are much lower than use of alcohol and tobacco, the trend for illicit substance use, particularly marijuana, is increasing (Villatoro-Velázquez et al., 2012). In the central region of the country, where Guadalajara and Mexico City are located, marijuana use more than doubled between 2002 and 2011, a larger increase than in any other region of the country (Villatoro-Velázquez et al., 2012). Although the prevalence of illicit drug use remains low among adolescents, the majority of adult illicit drug users report that they started using alcohol and tobacco before the age of 17 (Instituto Nacional de Salud Pública, 2008). Preventing alcohol and tobacco use among adolescents may thus also help deter illicit drug use in adulthood.

School-based prevention interventions that aim to delay the initiation of substance use are associated with lower rates of substance use in Mexico. Mexican youth who have not participated in substance use prevention programs report much higher rates of drug use than those who have participated; among male adolescents the ratio is 8:1, and among female adolescents, it is 5:1 (Villatoro-Velázquez et al., 2012). Despite their apparent impact in delaying initiation of adolescent drug use, substance use prevention interventions in Mexico are less prevalent than in the US. In a national sample of Mexican youth (12–25) collected in 2008, 57 % reported that they had never participated in a substance use prevention intervention (Instituto Nacional de Salud Pública, 2008), a rate that remained unchanged in 2011 (Villatoro-Velázquez et al., 2012).

The present study advances existing knowledge about the applicability of an efficacious prevention intervention originally developed and tested in the United States with Mexican–American youth, and its transferability for use with youth populations in Mexico. Communication competence theory guided the development of the intervention and its application in the Mexican context (Spitzberg & Cupach, 1984). The theory posits that when youth are more skillful and comfortable using a variety of communication techniques to reject risky or undesirable influences, such as substance use offers, they are less likely to engage in those behaviors. Within this framework cultural norms shape communication

patterns, including acceptable and unacceptable ways to resist substance offers in different social contexts (Okamoto et al., 2010).

This study examines the effects of an intervention designed to enhance communication competence in the Mexican context, ultimately assessing the feasibility of transferring existing efficacious interventions into Mexican society. The general hypothesis framing the study is that the *keepin'it REAL* intervention— in its Spanish language version *Mantente REAL*—can be feasibly implemented in Mexico, and will ultimately achieve the level of efficacy obtained in the United States with Mexican–American youth.

Substance Abuse Prevention

School-based universal programs are the primary mode of substance abuse prevention in the United States, attaining varying degrees of efficacy (Tobler et al., 2000). Interactive curricula that teach life skills and allow youth to interact and practice those skills report larger effects on substance use initiation than those that simply communicate information (Tobler et al., 2000). Some evidence suggests the degree that the curriculum is culturally grounded impacts the program's efficacy (Griner & Smith, 2006). For example, culturally specific and multi-cultural substance abuse prevention interventions are more effective with Mexican–American youth than unadapted interventions targeting the cultural mainstream (Kulis et al., 2005).

Although the US has developed and tested a wide array of substance abuse prevention programs, these interventions are less commonly implemented in Mexico and even more rarely evaluated for effectiveness using rigorous methods (Marsiglia et al., 2014). Those that have been tested in Mexico report limited effects on actual substance use (Alonso Castillo, Esparza Almanza, Frederickson, Guzmán Facundo, & Martínez Maldonado, 2011; Arenas-Monreal et al., 2010). To address the need and fill the gap in evidence-based prevention programs in Mexico, we implemented a school-based substance use prevention program widely used in the United States and several other countries—*keepin' it REAL*—among youth from a large urban area of central Mexico, and evaluated the long term effects of the intervention on substance use. We selected *keepin' it REAL* because the original curriculum reflects the experiences of Mexican–American youth in a region bordering Mexico and because it uses an interactive approach to primary prevention that is a highly effective format with preadolescents (Kulis et al., 2005; Marsiglia & Hecht, 2005). Although the cultural context of Mexico differs from that of Mexican–American youth living in the US, preliminary studies indicated that the core elements of the *keepin' it REAL* intervention, including the drug resistance strategies it teaches, were relevant to Mexican youth from different regions (Kulis, Marsiglia, Ayers, Booth, & Nuño-Gutiérrez, 2012; Kulis, Marsiglia, Ayers, Calderón-Tena, & Nuño-Gutierrez 2011; Kulis, Marsiglia, Castillo, Bercerra, & Nieri, 2008; Marsiglia, Kulis, Martínez-Rodríguez, Becerra, & Castillo, 2009).

keepin' it REAL—The developers of *keepin' it REAL* based the curriculum on communication competence theory (Spitzberg & Cupach, 1984). This theory argues that adolescents need multiple types of communication skills to deal with behavioral health risks and knowledge of how to employ them flexibly and judiciously. Having a range of drug

resistance strategies from which to choose allows adolescents to adapt to different scenarios in which substances are made available or offered to them (Wright, Nichols, Graber, Brooks-Gunn, & Botvin, 2004). The *keepin' it REAL* curriculum teaches students the four resistance strategies—Refuse, Explain, Avoid, and Leave (REAL)—that are used most commonly by youth in the US and Mexico (Kulis et al., 2008, 2011, 2012; Marsiglia & Hecht, 2005; Marsiglia et al., 2009). Refuse is a direct "no"; Explain is a refusal accompanied by a reason for declining the substance offer; Avoid is the act of not attending an event or participating in a gathering where alcohol or drugs will be available; Leave is removing one's self from a situation where alcohol or drugs are present. The curriculum teaches these strategies through real life scenarios developed from qualitative research with adolescents, and provides opportunities to rehearse the use of the skills (for more details about the intervention see Marsiglia et al., 2014).

The results of the initial randomized trial of *keepin' it REAL* in 35 schools in the southwestern United States demonstrated that the program was efficacious. Relative to the control group, the intervention group reported less alcohol and marijuana use and more refusal confidence (Hecht et al., 2003), results that were confirmed in a sub-sample of Mexican–American youth (Kulis et al., 2005). The intervention, however, did not significantly affect Mexican–American youth's cigarette use. Levels of acculturation appeared to have an impact on the intervention's efficacy, with more acculturated youth demonstrating a larger desired effect (Marsiglia, Kulis, Wagstaff, Elek, & Dran, 2005). These findings led researchers to consider whether *keepin' it REAL* would effectively prevent substance use among youth residing in Mexico.

Considering Culture

Cultural norms and values have the potential to impact individuals' experiences of substance use offers as well as their interpretation of messages conveyed in substance abuse prevention interventions (Félix-Ortiz et al., 2001). One particularly salient set of norms in the Mexican context is gender norms that dictate permissible and unacceptable behavior. Despite evidence that gender roles in Mexico are changing, families continue to reinforce traditional gender roles for women in some regions (Alducin et al., 2004; Mendoza Flores, Sánchez Jiménez, García Cardona, & Ávila Rosas, 2002). A commonly-held traditional Mexican ideal of femininity views women as submissive to men, focused on the family, and morally virtuous (Toro-Morn, 2008). These ideals also communicate to women that they should not use alcohol or other drugs (Kulis, Marsiglia, & Hecht, 2002; Medina-Mora & Rojas Guiot, 2003; Mora-Ríos & Natera, 2001). Conversely, gender norms for men encode and encourage more permissive attitudes toward substance use (Alvarez-Gayou, 2007). In alignment with these norms, older adolescents in Mexico report using the REAL drug resistance strategies in gender-specific ways. Males use the strategies more often than females and their use of the strategies is more strongly associated with lower levels of substance use than for females (Kulis et al., 2011, 2012). When *keepin' it REAL* was implemented in Mexico, the short-term effects also demonstrated gender differences, but in a different direction. Female participants in *Mantente REAL*, but not their male counterparts, reported significantly lower alcohol and cigarette use than a control group when the sample was split by gender, although tests of interactions between gender and the treatment condition in the full sample

were non-significant (Marsiglia et al., 2014). The current study extends the investigation of the intervention's efficacy by evaluating its long-term effects on substance use behaviors and possible differential program effects by gender. Long-term effects are important to consider in prevention interventions because changes observed immediately following participation in the program may decay or reverse over time.

Method

Setting

This article reports results of a pilot study implemented in the city of Guadalajara, located in the central Mexican state of Jalisco. The research team chose Guadalajara to pilot test *keepin' it REAL* because it is a major population center, the second largest metropolitan area in Mexico, and mirrors national trends in substance use. The state of Jalisco reports rates of alcohol, binge drinking, and marijuana use among adolescents and young adults that are close to the national averages for Mexico, although somewhat lower rates of exposure to prevention programming (Instituto Nacional de Salud Pública, 2008). The binational research team of university investigators in Guadalajara and the United States developed and implemented the intervention with the goal of advancing knowledge on evidence-based prevention approaches for Mexico.

The pilot study included two public schools in Guadalajara, both at the second level of education (*secundarias*), comprising grades seven through nine and corresponding to middle schools or junior high schools in the United States. The team chose the schools, located only a few miles apart on the outskirts of the city, after ensuring that they had similar student profiles in terms of socio-economic status and academic performance. The schools were randomized into treatment conditions, one school receiving the intervention and the other serving as a control group. Study participants were all students in the second year of their *secundaria* school, or the equivalent to 8th grade in the United States.

Curriculum Training and Delivery

Ten classrooms participated in the pilot study, five per school. In the treatment school, five social studies teachers implemented *keepin' it REAL* after receiving in-person training from a US-based *keepin' it REAL* trainer employed by the US university. The manualized training introduced teachers to the Spanish language version of *keepin' it REAL* curriculum, with opportunities to ask questions, discuss each lesson, and practice lesson presentations. The US-based project coordinator and the principal investigators from both universities visited the schools and met with the principals, teachers and some of the students before, during, and after project implementation. In addition, the Mexican research team also met with their US collaborators to plan the curriculum implementation, lesson fidelity observations, and the development and administration of the students' pre- and posttest surveys.

The *Mantente REAL* curriculum incorporated surface modifications of the US version of *keepin' it REAL* but the content of the lessons was essentially the same as the original Model program. Language modifications included translating lessons into Spanish, dubbing the accompanying videos in Spanish, and illustrating the REAL strategies with colloquial

Spanish scenarios. The team also translated the English language questionnaires used to assess the intervention's effect, following back-translation procedures recommended by Rogler (1989). In addition to modifying the language, rather than delivering one lesson a week, the teachers in Guadalajara presented two lessons a week to ensure completion before the December recess, making the duration of the intervention shorter than its typical delivery. Several procedures promoted curriculum fidelity. The teacher-implementer training included discussion of how to maintain fidelity to the curriculum, and trained lesson observers recorded fidelity on standardized forms for two of the four "core" curriculum lessons—those presenting the REAL strategies. Teacher-implementers also completed a feedback form at the end of each lesson, noting delivery problems and departures.

Survey Administration

Research team members administered a pretest survey to student participants in the treatment group prior to the implementation of the curriculum. Two posttests followed the curriculum, one immediately after the delivery of the last *keepin' it REAL* lesson, and another approximately 8 months after program completion, when the students began their ninth grade school year (3rd year of *secundaria*). Students at the control school completed their surveys at the same time as those in the treatment group. The current analysis examines changes from pretest to the first and second posttests.

The Institutional Review Boards at both participating universities approved the study's human subjects' protections. Prior to data collection, the schools notified the parents of all eighth grade students in both schools that their children would be participating in the *keepin' it REAL* research study. If they had any questions or did not want their child to participate they were invited to contact the school or the research team with questions or to inform them of their decision not to participate. The research team members that administered the surveys assured students that all answers were confidential, and students provided written assent that their participation in the surveys was voluntary. None of the students refused to participate.

The questionnaires collected information on sociodemographic characteristics and substance use behaviors, as well as substance use norms, intentions, expectancies, and drug resistance skills. This article examines use of the three substances consumed most commonly by the youths in the study, and among adolescents in Mexico: alcohol, cigarettes and marijuana. The Mexican-based research team entered the data and provided the US-based research team with a data set that excluded all personally identifying information. The sample size for this study was 431 (Control $n = 206$; Treatment $n = 225$) before adjustments for missing data on particular variables. Of the students who completed the pretest questionnaire, 90 % completed the immediate posttest and could be matched to their pretest, and 86 % completed a matchable long-term posttest questionnaire.

Measures

Substance Use—The team analyzed the frequency and amount of alcohol, cigarette, and marijuana use at the pretest and the two posttests to test the effectiveness of the substance use prevention program. To assess frequency of substance use the survey included the

following questions: “In the past 30 days, how many times did you drink an alcoholic beverage?”; “In the past 30 days, how many times did you smoke tobacco or cigarettes?”; “In the past 30 days, how many times did you smoke marijuana?” All three of these questions had Likert scale responses: 0 = none, 1 = once, 2 = 2–3, 3 = 4–7, 4 = 8–15, 5 = 16–30. To assess amount of use for each substance the survey asked: “In the past 30 days, how many alcoholic drinks did you have?” (0 = none, 1 = 1 drink, 2 = 2–3, 3 = 4–7, 4 = 8–15, 5 = 16–30 and 6 = more than 30 drinks); “In the past 30 days, how many cigarettes have you smoked?” (0 = none, 1 = a puff, 2 = 1 cigarette or part, 3 = 2–3, 4 = 4–5, 5 = 6–10, 6 = 11–20, 7 = 1–5 packs) “In the past 30 days, how many hits [*toques*] of marijuana have you had?” (0 = none, 1 = one hit, 2 = 2–3, 3 = 4–5, 4 = 11–20, 5 = 20–40 to 6 = 40 or more).

Independent Variables—Statistical models included two independent variables: treatment condition (coded 0 = control group and 1 = intervention group) and the respondent’s gender (coded 0 = female and 1 = male).

Analysis Strategy

The study assessed the effect of the *keepin’ it REAL (kiR)* intervention on substance use over time using growth curve models, which are hierarchical linear models that adjust for random effects nested at multiple levels (Raudenbush & Bryk, 2002). Trajectories obtained from these models represent changes in substance use across multiple survey waves. Unconditional models tested whether random effects on substance use occurred at both the student and classroom levels, and whether linear or curvilinear models fit the data for each outcome. The unconditional models indicated that clustering did not occur at the classroom level, and that linear modeling of the growth curve trajectory would adequately describe the changes in substance use over time. The conditional growth curve analyses employed datasets using list-wise deletion of cases with missing data on model variables, and the analyses were then repeated using multiple imputation of missing data, following Graham’s (2012) recommendations. Over 90 % of the data were non-missing, and the pattern of significant results was the same with and without imputation. Thus, the tables below present only the non-imputed results.

Using SAS 9.3, the level 1 model of the growth curve has the following formula:

$$Y_{ti}=\pi_{0i}+\pi_{1i}\alpha_{ti}+e_{ti}$$

where Y_{ti} represents the substance use outcome at time t for student *i*. The initial level of substance use by individual *i* is π_{0i} and the linear level of substance use by individual *i* is π_{1i}. The error is assumed to be normally distributed as represented by e_{ti}. Representing survey waves, the timing variable, α_{ti}, assumes linear values (0, 1, 2). The next two equations describe the level 2 model, where dichotomous indicators for the treatment group and gender predict the initial (π_{0i}) and linear (π_{1i}) levels of substance use.

$$\pi_{0i}=\beta_{00}+\beta_{01}(Treatment\ Group)+\beta_{02}(Gender)+\beta_{03}(Gender\times Treatment\ Group)+r_{0i}$$
$$\pi_{1i}=\beta_{10}+\beta_{11}(Treatment\ Group)+\beta_{12}(Gender)+\beta_{13}(Gender\times Treatment\ Group)+r_{1i}$$

Preliminary analysis confirmed the population homogeneity of the sample on key demographic characteristics, finding no statistically significant differences between the treatment and control group schools on age, family financial strain, and student academic performance (“usual” grades in school).

Results

Table 1 presents descriptive statistics on the sample at pretest and information on the substance use outcomes across waves. The mean student age was 13 years, and male students were somewhat less numerous than female students (45 vs. 55 %). Mean substance use frequency and amounts were highest for alcohol at all three survey waves, and lowest for marijuana, although the means for all outcomes fell between the scale values indicating no use of the substance in the past 30 days and use at the lowest possible level. These means increased from wave 1 to wave 3 for alcohol and marijuana and declined for cigarettes. However, the percentage of students reporting any use of the substance increased from wave 1 to wave 3 for all three substances, by about 10 % for alcohol, and by 3 % for cigarettes and marijuana. The unconditional model including time variables (i.e., survey wave 1, 2 or 3) in both linear and quadratic form, which are not shown, supported use of a linear growth model rather than a model in quadratic form. The conditional growth curve models estimated treatment effects for frequency and amounts of use of alcohol, cigarettes, and marijuana (see Table 2). Each model has the same predictors with coefficients associated at the initial and linear levels, and these models predict changes over the three survey waves.

Pretest Equivalence

In the models presented in Table 2, fixed effects coefficients associated at the initial level represent baseline (i.e., pretest) differences. The models for alcohol amount and frequency (models 1 and 2) and for cigarette use and frequency (models 3 and 4) show no significant differences at baseline for the predictors. In the model for marijuana amount (hits) (model 5), treatment group and gender are marginally significant predictors of initial use, while the coefficient for the interaction between gender and treatment group is a significant predictor. These coefficients indicate that amounts of initial marijuana use were lower overall for males than for females, and were lower overall in the treatment group than in the control group, but higher among males in the treatment group than among males in the control group. Similarly, the model for marijuana frequency (model 6) includes a marginally significant gender effect on initial use, and a significant interaction between gender and treatment group; however, treatment group is not a significant predictor. These coefficients indicate less frequent initial marijuana use by males than by females overall, but more frequent use by males in the treatment group than by males in the control group. Thus, although students’ initial use of alcohol and cigarettes was equivalent at baseline by gender and by treatment group, gender differences were seen in initial levels of marijuana use and by treatment group.

Intervention Effects

The linear level fixed effects coefficients in Table 2 represent changes associated with growth and indicate how intervention conditions along with gender effects increase the use

of substances over time. There are statistically significant predictors of growth in the models for alcohol and marijuana use, but not for cigarette use. In model 1, the treatment group reports less growth in alcohol amounts than the control group at a marginally significant level. In model 2, predicting growth in frequency of alcohol use, the coefficients for treatment group and the treatment-by-gender interaction effect are statistically significant, and the gender coefficient is marginally significant. These coefficients indicate that alcohol frequency increased less steeply overall for the treatment group than for the control group, less for males than for females, and less for females in the treatment group than for those in the control group.

Figures 1 and 2 present the predicted aggregate trajectories of alcohol use in the treatment and control groups, separated by gender. Figure 1 exhibits the results from model 1 of Table 2, showing that females in both the control and treatment groups had higher initial amounts of alcohol use than their male counterparts. The trajectories from the growth curve model suggest that the intervention had a desired effect for females, as the slope for females in the treatment group is less steep in comparison to females in the control group. The intervention appears to have slowed the growth of the amount of alcohol use among female students. Although the intervention appears to have influenced alcohol use trajectories for female participants in the desired direction—slowing the growth of the amount of alcohol used—the trajectories for the males in the treatment and control groups are relatively equal. Therefore the intervention seems to have little or no effect on alcohol use amounts among male participants.

Figure 2 displays trajectories of alcohol frequency (model 2 in Table 2), showing again that females had higher initial frequency of use than males, and that the intervention appears to have influenced females more than males as there was little growth in the trajectory for females in the treatment group but sharp increases in the control group. In contrast, it appears that there was little difference in the trajectories among males in the treatment and control groups; thus the intervention was not as successful among males in slowing the growth in frequency of alcohol use.

The predictors of growth in marijuana use in Table 2 form a different pattern than those observed for alcohol use. In model 5 predicting marijuana amount (‘hits’), gender is marginally significant and the gender-by-treatment interaction effect is statistically significant. A similar pattern is observed for model 6, predicting marijuana frequency, except that both the gender and gender interaction effects are marginally significant. These coefficients indicate that the amount and frequency of marijuana use grew less for males than for females, and that males in the treatment group demonstrated less growth in use of marijuana than did males in the control group. These trends, however, should be interpreted very cautiously given the small number of marijuana users in the sample. There were only five girls and six boys reporting marijuana use at wave 1, increasing to twelve boys and twelve girls at wave 3.

Discussion

This pilot test in Guadalajara of the *keepin' it REAL*/*Mantente REAL* intervention produced evidence of its applicability, feasibility and potential program effects in Mexican middle schools (*secundarias*). Similar to the impact of participating in *keepin' it REAL* on Mexican–American youths' substance use (Kulis et al., 2005), long term desired program effects were observed for alcohol and marijuana use but not for cigarettes. And much like the demonstrated short term effects of the intervention on Mexican youth in Guadalajara, the long-term impact of participating in *Mantente REAL* on substance use appeared to differ by gender (Marsiglia et al., 2014). For girls, participation in *Mantente REAL* slowed the typical developmental increase in the amount of alcohol used and maintained the effects attained in the short term (Marsiglia et al., 2014). The slower growth in use of alcohol among girls in the treatment group appeared in contrast to a much sharper increase in alcohol use observed among girls in the control group. Results for boys did not demonstrate differences in alcohol use between the treatment and control groups.

Study results revealed a different pattern of program effects for the amount and frequency of marijuana use, although the small and only slowly increasing number of marijuana users across the three survey waves severely limits the interpretability of our findings. Males in the control group demonstrated a significantly steeper trajectory in the amount and frequency of marijuana use, while those in the treatment group reported little change. These desired program effects for two measures of marijuana were not observed among females. Although the findings may constitute artifacts of the small numbers of marijuana users and reflect unstable floor effects, they may also suggest that the intervention affects different types of substance use for boys than for girls at this developmental stage (Marsiglia et al., 2014).

Although the study did not collect information on gender norms surrounding substance use, our findings can be considered in light of how these norms, while changing, continue to influence Mexican youths. The differential efficacy of the intervention for males and females may reflect gender-specific expectations about acceptable forms of substance use, gender differences in exposure to substance offers, and gender-related ways of responding to substance offers that previous studies have demonstrated in Mexico (Kulis et al., 2012; Medina-Mora & Rojas Guiot, 2003; Mora-Ríos & Natera, 2001). Multiple cultural influences may be implicated in the greater desired effects of the intervention in restraining increases in alcohol use among girls. The prevention content of *Mantente REAL* may align with messages that girls in Mexico continue to receive from parents and other adults that women should abstain from or restrain their alcohol consumption. Girls may be more inclined than boys to internalize the intervention's prevention messages about alcohol use, and employ the drug resistance skills taught in *Mantente REAL*. The greater social acceptability of alcohol use by males may present a higher cultural bar for prevention messages to overcome, making it more difficult to prompt boys to use the drug resistance strategies in the curriculum to eschew use of alcohol. The curriculum's prevention messages may not be strong enough to counteract normative alcohol use messages for males heard at home or among peers. The desired program effects for marijuana—which emerged among

boys but not among girls—may suggest more malleable norms about the acceptability of marijuana use among males.

The findings confirm the narrowing of gender differences in substance use in Mexico, especially among younger generations. The study found no evidence of gender differences in the use of alcohol or cigarettes in the pretest survey administered before the intervention, when students were starting eighth grade, and the marginally significant baseline differences in marijuana use suggested slightly more initial use among girls than boys. Given possible instability in these measurements and the small differences found, the marijuana results need to be verified in larger studies. However, it is notable that this study found no evidence that pre- and early adolescent females used any of the three substances less than their male counterparts. The gendered patterns in the effects of *Mantente REAL* and the lack of gender differences in initial levels of substance use may also reflect developmental factors among pre- and early adolescents that change direction as the students mature. These findings point to the need for longitudinal and developmentally attuned research to document substance use experiences of Mexican girls and boys as they move from the cusp of entry into adolescence into later adolescence and young adulthood.

Limitations

Several methodological limitations should be considered when interpreting the findings. Although the sample was of adequate size to detect program effects on substance use outcomes, the inclusion of only two schools limits the generalizability of the findings. Second, our analysis is restricted to program effects on substance use behaviors and does not address how the program may have influenced the adoption of permissive drug use norms, attitudes and expectancies, a complex subject involving possible mediation effects on substance use, and one that deserves a separate and thorough report. Third, in this pilot test, *Mantente REAL* was implemented in 5 weeks rather than the 10-week format that was originally developed, implemented and tested in the US. The relative effectiveness of a 5 versus 10 week delivery has not been tested. The shorter time frame might impact program effectiveness in ways that enhanced or detracted from desired effects, for example by concentrating the prevention messages or by not allowing sufficient time to practice and master skills. Lastly, although gender differences in treatment effects may suggest that gender norms influenced the intervention's effectiveness, surveys did not directly measure gender norms and gender socialization processes.

Conclusions

The long-term effects of *Mantente REAL (keepin' it REAL)* on substance use among eighth grade students in Mexico followed similar patterns to the effects obtained when *keepin' it REAL* was implemented with Mexican–American youth in the United States. However, while previous studies did not find gender differences in the efficacy of *keepin' it REAL* in a Mexican–American sample, gender appears to have an impact on how the intervention affects substance use outcomes among pre-and early adolescents in Mexico. Further research is needed about the gendered experience of substance use in Mexico so that the intervention might be modified to be similarly effective for both genders.

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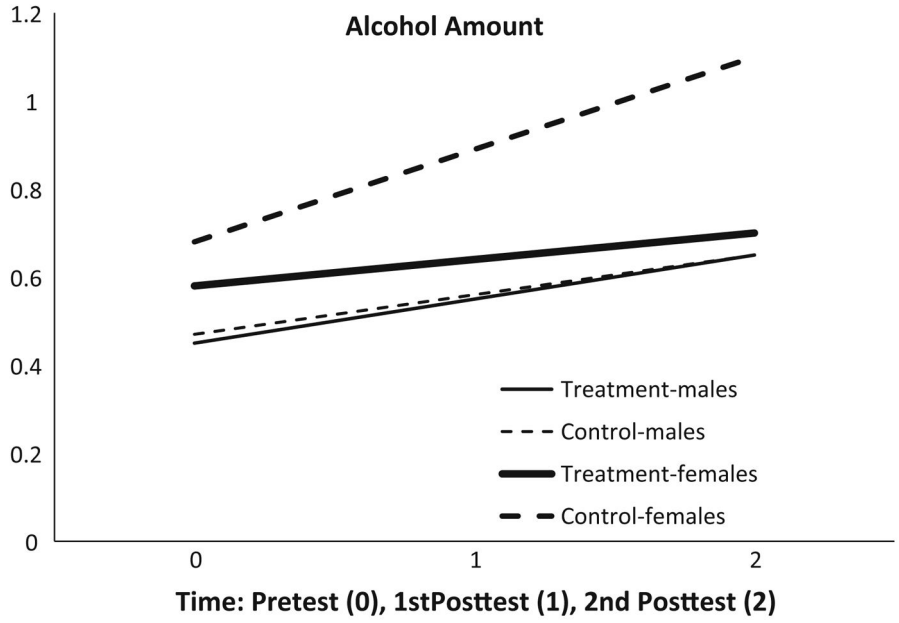

Fig. 1.

Predicted growth curve trajectories of number of alcoholic drinks consumed in the last 30 days for treatment and control groups, by gender

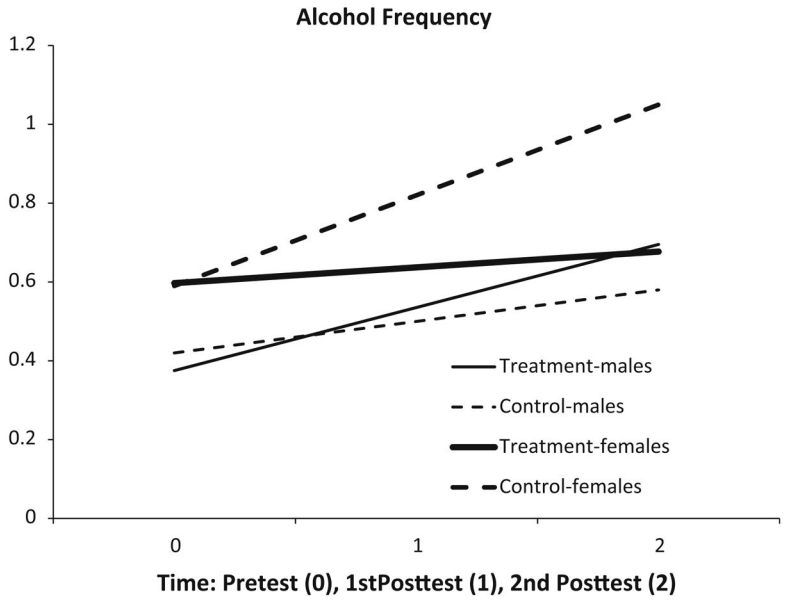

Fig. 2.

Predicted growth curve trajectories of number of days consuming alcoholic drinks in the last 30 days for treatment and control groups, by gender

Table 1

Descriptive statistics for study respondents (N = 431)

	Mean (%)	*SD*	Range	*N*	% Using substance
Age	13.01	0.44	12–15	431	–
Gender (female = 0, male = 1)	(45.2 %)	.50	0–1	431	–
Treatment group (no = 0, yes = 1)	(49.9 %)	0.5	0–1	431	–
Alcohol amount					
Wave 1	0.59	0.94	0–6	410	40.9
Wave 2	0.61	1.04	0–6	395	37.8
Wave 3	0.84	1.14	0–6	392	51.3
Alcohol frequency					
Wave 1	0.53	0.86	0–5	411	36.1
Wave 2	0.60	1.05	0–6	400	35.1
Wave 3	0.77	1.10	0–6	404	47.2
Cigarette amount					
Wave 1	0.28	0.96	0–7	418	13.6
Wave 2	0.27	0.95	0–8	399	14.1
Wave 3	0.24	0.84	0–8	402	16.9
Cigarette frequency					
Wave 1	0.24	0.80	0–6	418	14.4
Wave 2	0.27	0.93	0–6	400	14.6
Wave 3	0.20	0.67	0–6	401	16.2
Marijuana amount (hits)					
Wave 1	.028	0.25	0–4	425	2.2
Wave 2	.024	0.21	0–2	414	1.4
Wave 3	.056	0.40	0–6	395	6.3
Marijuana frequency					
Wave 1	.023	0.18	0–2	426	1.9
Wave 2	.019	0.18	0–2	414	1.2
Wave 3	.046	0.38	0–6	395	5.1

Table 2

Conditional linear growth models predicting substance use in last 30 days

	Alcohol				Cigarette				Marijuana			
	Model 1		*Model 2*		*Model 3*		*Model 4*		*Model 5*		*Model 6*	
	Amount		Frequency		Amount		Frequency		Amount (hits)		Frequency	
	b	***SE***	***b***	***SE***	***b***	***SE***	***b***	***SE***	***b***	***SE***	***b***	***SE***
Fixed effects												
Initial use π_{0i}												
Intercept β_{00}	.681***	.087	.592***	.086	.354***	.084	.281***	.074	.053*	.021	.039*	.017
Treatment (no = 0, yes = 1)	−.102	.124	.007	.119	−.061	.117	−.020	.061	−.062+	.030	−.034	.025
Gender (female = 0, male = 1)	−.213	.055	−.173	.134	−.189	.132	−.077	.109	−.053+	.031	−.048+	.027
Gender × treatment	.083	.181	−.052	.129	.154	.184	−.016	.154	.097*	.044	.079*	.037
Linear growth π_{10i}												
Intercept β_{10}	.214***	.055	.234***	.052	−.001	.049	.010	.004	−.009	.020	−.002	.019
Treatment (no = 0, yes = 1)	−.151+	.077	−.192*	.072	−.008	.068	.016	.147	.037	.029	.010	.027
Gender (female = 0, male = 1)	−.122	.083	−.154+	.079	.063	.074	−.011	.067	.056+	.032	.053+	.029
Gender × treatment	.164	.113	.273*	.109	−.128	.103	−.017	.092	−.087*	.043	−.070+	.040
Random effects												
Level 1												
Temporal variation ε_{ti}	.432***	.028	.422***	.026	.491***	.026	.401***	.021	.055***	.004	.041***	.002
Level 2 (student)												
Initial status r_{0i}	.490***	.050	.460***	.048	.389***	.041	.281***	.031	.004+	.003	.001	.000
Linear growth r_{1i}	.085***	.021	.065**	.019	.000	.000	.000	.000	.017***	.002	.019***	.002

+ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$