

Effect of Middle School Interventions on Alcohol Misuse and Abuse in Mexican American High School Adolescents Five-Year Follow-up of a Randomized Clinical Trial

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IMPORTANCE Substance abuse preventive interventions frequently target middle school students and demonstrate efficacy to prevent early onset and use of alcohol and illicit drugs. However, evidence of sustained results to prevent later patterns of alcohol misuse and more serious alcohol abuse disorders has been lacking, particularly for US Latino populations.

OBJECTIVE To test whether a universal middle school prevention program can reduce the frequency of alcohol misuse and rates of alcohol use disorder 5 years after implementation with a Mexican American sample.

DESIGN, SETTING, AND PARTICIPANTS A previous randomized clinical trial was conducted with 516 Mexican American 7th graders and at least 1 parent who identified as having Mexican origin. Three annual cohorts of families were recruited from rosters of 4 middle schools and randomized to the 9-session Bridges/Puentes family-focused group intervention or a workshop control condition. Recruitment, screening, pretest, and randomization occurred in the same academic year for each cohort: 2003-2004, 2004-2005, and 2005-2006. Data acquisition for the follow-up assessments of late-adolescent alcohol misuse and abuse, which were not included in the initial randomized clinical trial, was conducted from September 2009 to September 2014; analysis was conducted between August 2016 and July 2017. In this assessment, 420 children (81.4%) of the sample were included, when the majority were in their final year of high school.

INTERVENTIONS The 9-session Bridges/Puentes intervention integrated youth, parent, and family intervention sessions that were delivered in the spring semester at each school, with separate groups for English-dominant vs Spanish-dominant families. The control workshop was offered during the same semester at each school, also in English and Spanish.

MAIN OUTCOMES AND MEASURES Primary outcomes were diagnostic assessment of lifetime alcohol use disorder in the 12th grade, 5 years after the intervention, based on the Diagnostic Interview Schedule for Children and past-year frequency of alcohol use, binge drinking, and drunkenness based on the 2001 Youth Risk Behavior Survey.

RESULTS Of the 420 participants, 215 (51.2%) were girls (mean [SD] age, 17.9 [0.62] years). The intervention reduced the likelihood of having an alcohol use disorder ($\beta = -.93$; SE, 0.47; $P = .047$; odds ratio, 0.39). Intervention associations with past-year alcohol use frequency, binge drinking, and drunkenness were moderated by baseline substance use. The intervention reduced the frequency of alcohol use ($\beta = -.51$; SE, 0.24; $P = .04$; Cohen $d = 0.43$) and drunkenness ($\beta = -.51$; SE, 0.26; $P = .049$; Cohen $d = 0.41$) among youth who reported any previous substance use at baseline (T1 initiators) but not among those who had not initiated any substance use (T1 abstainers) at baseline. For past-year binge drinking, the intervention finding did not reach statistical significance among T1 initiators ($\beta = -.40$; SE, 0.23; $P = .09$) or T1 abstainers ($\beta = .23$; SE, 0.14; $P = .11$).

CONCLUSIONS AND RELEVANCE Study results support an association between a universal middle school intervention and alcohol misuse and alcohol use disorders among Mexican American high school students and implementation of universal middle school interventions to reach Latino communities.

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A 2016 US Surgeon General's report identified alcohol and drug misuse and abuse as 1 of America's most pressing public health concerns and called for widespread implementation of evidence-based interventions (EBIs) to prevent early initiation and subsequent misuse in adolescence.¹ Alcohol misuse (ie, underage drinking, frequent drunkenness, and binge drinking) coincides with a variety of risky behaviors in adolescence that carry a significant public health burden, including school dropout, risky sex, intimate partner violence, and drunk driving.^{1,2} Adolescents who initiate drinking early, particularly before age 14 years, also experience more chronic and intensive use and greater risk of developing alcohol use disorders (AUDs).³⁻⁶ Thus, EBIs for middle school youth are often prioritized in community prevention efforts because they target the developmental period when many youths begin experimenting but before patterns of misuse emerge.⁷⁻⁹ Universal EBIs aimed at the general adolescent population¹⁰ are especially appealing because they do not single out or label high-risk individuals, and they also promote bonding to school and community.¹¹

Randomized clinical trials (RCTs) demonstrate the efficacy of middle school EBIs to reduce risk factors and delay initiation and misuse of tobacco, alcohol, and other drugs up to 2 years later.¹²⁻¹⁶ A few RCTs found sustained effects on alcohol outcomes 5 to 10 years later, indicating that these programs not only prevent the onset and frequency of underage drinking but may also prevent later progression to abuse and dependence.^{14,16-18} However, sustained effects on alcohol use are not consistently found.¹⁹ Even in RCTs showing long-term reductions in the use of other drugs, adolescent drinking has been resistant to change,²⁰⁻²⁴ with substantial variability across RCTs.²⁵ Furthermore, although long-term effects on AUDs are often reported for interventions targeted at younger ages when development may be more malleable,²⁶⁻²⁸ effects on AUDs are rarely reported for universal middle school interventions. Thus, the role of middle school EBIs in preventing addiction remains in question. Addressing these gaps, this RCT follow-up examined associations between a middle school intervention and alcohol misuse and AUD 5 years later in a Mexican American sample.^{29,30}

Our Mexican American focus is important because several population studies show that Latino adolescents are a high-risk group for alcohol use in the United States,^{31,32} and adolescents of Mexican descent report elevated rates relative to other racial/ethnic groups.^{33,34} Latino disparities are particularly pronounced on 2 patterns of adolescent misuse—early initiation and binge drinking—that elevate risk for long-term negative consequences.³⁵ Latinos also face culture-specific risks, such as acculturation-associated difficulties, discrimination, economic hardship, and educational inequalities, that may undermine developmental pathways and prevention benefits across adolescence.^{36,37} Culturally adapted EBIs address these risks, yet most have not reported long-term associations with alcohol misuse and disorder.³⁸⁻⁴² One exception, an RCT of a Latino parent-focused intervention, reported greater reductions in AUD in families receiving care through Familias Unidas compared with standard community care 2 years later.⁴³ However, this study targeted older delinquent youths (ie, se-

Key Points

Question Can a universal middle school intervention reduce alcohol misuse and risk for alcohol use disorders for Mexican American adolescents in high school?

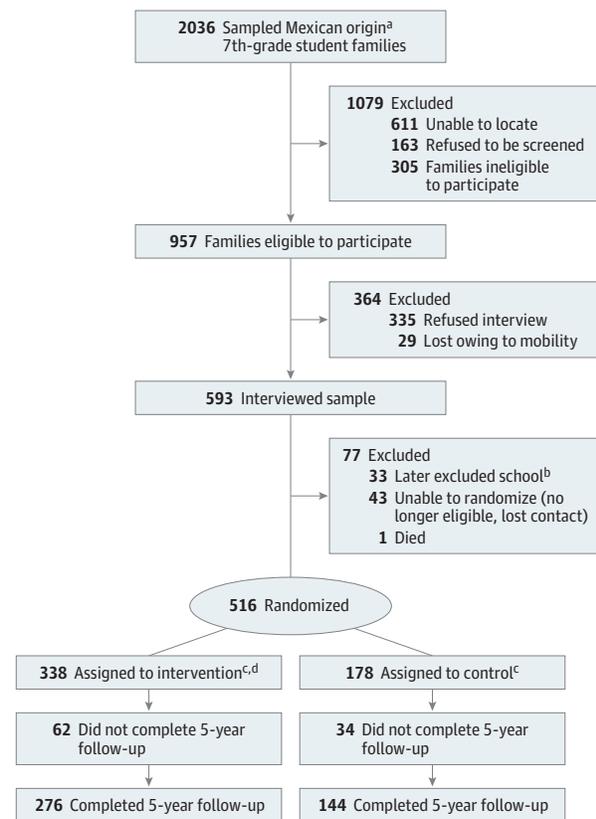
Findings In this follow-up of a randomized clinical trial that included 516 Mexican American adolescents, the 9-week middle school intervention significantly reduced the likelihood of an alcohol use disorder 5 years later. The associations of the intervention with the frequency of drinking and drunkenness were significant for early initiators of substance use but not for early abstainers, and the association with binge drinking was not significant for either subgroup.

Meaning Study findings support broad implementation of universal preventive interventions with Latino middle school students to reduce problem drinking in high school.

lective vs universal prevention). Although the intervention reduced the percentage of adolescents meeting diagnostic criteria for alcohol dependence, it did not affect alcohol use frequency compared with community care. Study investigators surmised that this lack of effect may have been owing to cultural norms in some Latino communities in which adolescent drinking is socially acceptable and common.⁴⁴

Herein we report on the examination of a 5-year follow-up to the RCT of Bridges/Puentes, a combined parent and youth EBI that previously demonstrated efficacy to delay middle school initiation and subsequent experimentation (ie, number of substances tried) in high school.^{29,30} Bridges/Puentes was informed by several evidence-based practices. First, evidence indicates that combined parent-youth programs may be more effective at producing lasting benefits because they emphasize risk reduction (prevention) as well as positive youth development (promotion) in multiple domains (family, school, and peers).^{13,45-49} Second, Bridges/Puentes targeted several key mediators responsible for sustained effects in prior EBIs,⁵⁰⁻⁵² including parenting practices and family dynamics, youth social-cognitive coping competencies, and school engagement.^{29,30,53} Finally, Bridges/Puentes was adapted to address culture-specific risks and promote cultural strengths, consistent with extant EBIs for Latinos.^{54,55} This blend of evidence-based practices and good recruitment rates, retention, and fidelity provided a strong foundation for testing the sustained results of middle school prevention for Latinos.

We examined 5-year associations between the intervention and past-year frequency of alcohol use, drunkenness, and binge drinking, as well as on lifetime AUD, and also examined whether these associations were moderated by baseline substance use. We hypothesized that adolescents randomized to Bridges/Puentes would show less frequent alcohol use, drunkenness, and binge drinking and reduced odds of having an AUD compared with those randomized to a control workshop condition. Consistent with evidence that prevention works best for those at higher risk,¹¹ we hypothesized stronger associations for adolescents who initiated substance use at the baseline assessment.

Figure. Flowchart of Intervention Recruitment, Enrollment, Randomization, and Retention

^a Recruitment, screening, pretest, and randomization occurred in the same academic year for each successive cohort: 2003-2004, 2004-2005, and 2005-2006.

^b A greater proportion of the English subsample was randomized to the intervention than control (70% vs 30%) compared with the Spanish subsample (60% vs 40%) owing to higher levels of attendance expected in the Spanish subsample.

^c Of 338 families randomized to the intervention condition, 213 (63.0%) attended at least 5 sessions and 112 (33.1%) attended all 9 sessions; 56 (16.6%) did not attend any sessions.

^d Initial recruitment included 5 schools, but 1 school was dropped before randomization because of low numbers of English-speaking families.

the intervention to determine interest and fit with the following eligibility criteria: adolescent of Mexican descent was younger than 15 years and enrolled in the target school, at least 1 caregiver of Mexican descent was interested in participating, and the family was willing to be randomized to the 9-week intervention or 1-session workshop. Of eligible families, 593 (62.0%) enrolled and completed pretest interviews. One month before the start of the intervention and workshop conditions, the study methodologist used a random number generator to randomize families that completed pretest interviews and were still eligible. Research assistants contacted families by telephone to inform them of their assignment. The RCT was conducted in academic years 2003-2004, 2004-2005, and 2005-2006. Data were collected for the present follow-up study from September 2009 to September 2014; analysis was conducted between August 2016 and July 2017.

In addition to the outcome of late-adolescent alcohol use and abuse, which was not included in the original RCT, a priori outcomes for the follow-up study that are reported elsewhere^{30,53} include high school grade point average, high school dropout, externalizing behavior problems and disorder, and internalizing symptoms and disorder. Study procedures for the follow-up reported herein were approved by the Arizona State University Office of Research Integrity and Assurance and described previously. The follow-up study protocol is available in the eAppendix in the Supplement.⁵⁷ Written informed consent or assent was obtained from the participants. Each participant received \$30 per assessment.

Data Collection and Retention

Data collection for the present analyses occurred prior to the intervention (T1) and 5 years after the intervention (T2). Adolescent- and parent-report data were collected through separate in-home, computer-assisted interviews that lasted approximately 2.5 hours, beginning with written informed consent procedures. Interviews were conducted in the participants' preferred language (English or Spanish) by linguistically matched interviewers who were blinded to condition. Questions were read aloud to minimize literacy issues, and responses were entered on the computer. Of the 516 randomized youth, 420 (81.4%) were retained at T2. Retained youth had higher T1 grades, lower rates of T1 substance use, and were more likely to have participated in the Spanish language intervention.

Intervention and Workshop Conditions

Program delivery for the intervention and workshop occurred in the spring semester of 7th grade for each cohort.²⁹ Grounded in ecodevelopmental systems⁵⁸ and risk and protective factor¹⁰ frameworks and modeled on the format of the Strengthening Families Program,⁵⁹ Bridges/Puentes integrated 3 components delivered in 9 weekly sessions at the adolescents' schools: (1) an adolescent coping intervention, (2) parenting intervention, and (3) family strengthening intervention. Detailed descriptions of the intervention have been provided.⁶⁰ Program adherence, assessed by independent raters of video-recorded sessions, revealed high rates of fidelity: 91% of adolescent and 88% of parent components were delivered.

Methods

Procedures

Participants, Recruitment, and Randomization

The sample in the RCT comprised 516 Mexican American youths recruited in the 7th grade from 4 schools in a Southwestern metropolitan area. The Figure shows the CONSORT diagram.

All schools had high Hispanic enrollment (69%-82%) and qualified for Title I status.⁵⁶ In the RCT, 3 cohorts of Hispanic students were identified and randomly selected from school rosters at the beginning of each school year, with the family's primary language used to select English and Spanish recruitment samples. A parent recruitment telephone call described

Table 1. Baseline Descriptive Statistics by Intervention Condition^a

Characteristic	Control	Bridges/Puentes	Test Statistic	P Value
Language group, No. (%)				
Spanish	104 (58.4)	171 (50.6)	$\chi^2_1 = 2.88$	.09
English	74 (41.6)	167 (49.4)		
Sex, No. (%)				
Male	82 (46.1)	172 (50.9)	$\chi^2_1 = 1.08$	.30
Female	96 (53.9)	166 (49.1)		
Family structure, No. (%)				
Single parent	27 (15.2)	58 (17.2)	$\chi^2_1 = 0.34$	.56
2 Parent	151 (84.8)	280 (82.8)		
Child nativity, No. (%)				
Mexican born	32 (18.0)	68 (20.1)	$\chi^2_1 = 0.34$	.56
US born	146 (82.0)	270 (79.9)		
Mother nativity, No. (%)				
Mexican born	62 (35.8)	134 (41.7)	$\chi^2_1 = 1.64$	.20
US born	111 (64.2)	187 (58.3)		
30-d Alcohol use ^b				
None	166 (93.3)	307 (91.1)	$\chi^2_1 = 0.73$	.39
Any	12 (6.7)	30 (8.9)		
30-d Drunkenness, No. (%) ^b				
None	175 (98.3)	326 (96.7)	$\chi^2_1 = 1.10$	.30
Any	3 (1.7)	11 (3.3)		
Youth age, mean (SD), y	12.28 (0.50)	12.33 (0.56)	$t_{400.73} = -1.04$	.30
Mother age, mean (SD), y	37.24 (6.05)	37.55 (6.69)	$t_{492} = -0.50$	.62
Highest parent education, mean (SD), y	10.97 (3.38)	11.05 (3.03)	$t_{514} = -0.25$	.80
Family socioeconomic status, mean (SD) ^c	0.05 (0.74)	0.03 (0.72)	$t_{514} = 0.30$	.77
No. of substances tried, mean (SD)	0.43 (0.90)	0.56 (0.99)	$t_{391.92} = -1.58$	.11

^a Percentages reflect the percentage of each condition made up by members of the demographic group.

^b Past 30-day alcohol use and drunkenness reflect any past month alcohol use and drunkenness.

^c Calculated as the mean of z scores for highest level of parent occupation, highest level of parent education, and household income.

Adolescents and parents randomized to the workshop condition jointly attended a 1.5-hour workshop similar in structure and theme to the Bridges/Puentes intervention, including separate and combined parent-youth group discussions and development of individualized plans to support middle school success. The intervention theory and components, strategies to ensure quality, and the control workshop are summarized at <http://reachinstitute.asu.edu/LatinoAlcoholMisuseAbuse> (eAppendix in the Supplement).

Measures

Baseline Covariates | Language group, family structure (1- or 2-parent household), sex (0, male; 1, female), and T1 substance use were reported at baseline. T1 substance use was measured using adolescent self-report on lifetime use of tobacco, alcohol, marijuana, and other illegal substances based on 6 questions taken from the 2001 Youth Risk Behavior Survey,⁶¹ and the total number of substances ever used was derived for each adolescent. One hundred fifty-two (29.5%) of the youth reported having used at least 1 substance at T1.

Outcome Measures | Alcohol and substance use were assessed in the present follow-up study using adolescent reports based on evidence that they are the best reporters on these types of behaviors.⁴⁷ (The original RCT focused on mediators [coping, school engagement, parenting, and family relationships] and

outcomes [internalizing symptoms, externalizing behavior problems, and substance use initiation] in middle school; trial ID [NCT00051727](https://clinicaltrials.gov/ct2/show/study/NCT00051727), funded by National Institutes of Health grant MH064707.) The present study, funded by a competing renewal, examined secondary alcohol misuse and disorder outcomes in late adolescence. At T2, past-year drinking was assessed using 3 items from the 2001 Youth Risk Behavior Survey that demonstrate moderate to high reliability among high school students⁶²: During the past year, on how many days did you have at least 1 drink of alcohol? During the past year, on how many days did you drink enough to feel pretty high/drunken? During the past year, how often did you have 4 [girls] or 5 [boys] or more drinks containing any kind of alcohol in a 2-hour period?⁶¹ Responses ranged from 0 (0 days in the past year) to 9 (every day in the past year). Lifetime AUD (0, no diagnosis; 1, yes diagnosis) was based on the Diagnostic Interview Schedule for Children,^{63,64} a structured diagnostic interview based on *DSM-IV* criteria that demonstrate moderate to high reliability and validity as well as sensitivity in identifying adolescents with independent medical AUD diagnoses.^{65,66}

Statistical Analysis

Intent-to-treat analysis, which includes every randomized family regardless of whether they ever attended the intervention, was used. Intervention effects on T2 outcomes were examined with analysis of covariance (ANCOVA) for the continuous variables (past-year alcohol use, binge drinking, and drunkenness) and

Table 2. Main and Moderated Intervention Effects With Alcohol Use, Misuse, and Disorder in 516 Adolescents^a

Model	AUD		Alcohol Use		Drunkenness		Binge Drinking	
	β (SE)	P Value	β (SE)	P Value	β (SE)	P Value	β (SE)	P Value
Main Effects								
Intervention condition								
Adjusted ^b	-.93 (0.47)	.047	-.16 (0.19)	.40	-.17 (0.17)	.33	-.04 (0.15)	.79
Unadjusted	-.88 (0.44)	.047	-.11 (0.20)	.58	-.11 (0.19)	.54	<.01 (0.16)	>.99
Moderated Effects								
Adjusted ^b								
Intervention condition	-.85 (0.53)	.11	.10 (0.20)	.61	.09 (0.17)	.61	.23 (0.14)	.11
T1 SU	.55 (0.23)	.02	.98 (0.19)	<.001	.93 (0.22)	<.001	.84 (0.21)	<.001
Intervention \times T1 SU	-.10 (0.35)	.78	-.61 (0.24)	.01	-.60 (0.26)	.02	-.63 (0.25)	.01
Unadjusted								
Intervention condition	-.80 (0.53)	.13	.12 (0.20)	.57	.12 (0.17)	.48	.25 (0.14)	.08
T1 SU	.60 (0.21)	.004	1.00 (0.25)	<.001	1.00 (0.22)	<.001	.88 (0.22)	<.001
Intervention \times T1 SU	-.12 (0.33)	.73	-.59 (0.25)	.02	-.61 (0.28)	.03	-.63 (0.26)	.02

Abbreviations: AUD, alcohol use disorder; SU, substance use; T1, any substance use at baseline.

^a Unstandardized regression coefficients (SEs) reported.

^b Adjusted models include covariates of sex, family structure, and T1 substance use.

logistic regression for the binary variable (lifetime AUD) using Mplus, version 7.2 (Muthén & Muthén).⁶⁷ The assumptions (eg, random independent samples, normality, homogeneity of variance, and regression slopes) for logistic regression and ANCOVA were examined beforehand and found to be satisfactory except for having mildly skewed data on binge drinking and drunkenness (skewness, 2.53 and 2.14, respectively). Maximum likelihood estimation with robust SEs was used for the binary and nonnormal outcomes, and full information maximum likelihood was used to handle missing data ($n = 516$). T1 family structure, child's sex, and language group were included in initial models as potential covariates. Covariates that were related to at least 1 T2 outcome (child's sex, family structure, or T1 substance use) were retained in all 4 models. Hypothesized moderated intervention effects by T1 substance use were modeled with an interaction term. Significant interactions were probed to examine how the intervention results varied between youths who had never used any substance (T1 abstainers) and youths who had used at least 1 substance at T1 (T1 initiators). All models were 2-tailed tests with significance set at $P < .05$.

Results

Descriptive statistics by intervention condition for demographic and T1 study variables are included in Table 1. No significant differences were found. Of the 420 participants (81.4%) in the T2 evaluation, 215 (51.2%) were girls; mean (SD) age was 17.9 (0.62) years. The upper panel of Table 2 presents main effects of the ANCOVA and logistic regression analyses. Female sex was associated with less frequent T2 past-year alcohol use, drunkenness, and binge drinking but not lifetime AUD. Living in a 2-parent family was associated with less past-year drunkenness but not past-year alcohol use, binge drinking, or lifetime AUD. T1 substance use was associated with all outcomes. There were no adverse intervention results.

Bridges/Puentes Results in Full Sample

The program's main effect on lifetime AUD at T2 was significant: being in the Bridges/Puentes intervention condition was associated with a lower likelihood of a lifetime diagnosis of AUD than the control condition. Control group participants were approximately 2.5 times more likely to experience a lifetime AUD by T2 than Bridges/Puentes participants (odds ratio, 0.39; 95% CI, 0.16-0.99), with 12 of 139 control group participants (8.6%) and 10 of 254 Bridges/Puentes intervention participants (3.9%) qualifying for a diagnosis.

Bridges/Puentes Results in High-Risk Youth

The association with past-year frequency of alcohol use, binge drinking, and drunkenness was conditioned by T1 substance use. The lower panel of Table 2 reports the results of ANCOVA and logistic regression for the moderation effect models. T1 substance use significantly moderated intervention results for all 3 past-year drinking outcomes. Among T1 initiators, the intervention was associated with less frequent alcohol use ($\beta = -.51$; SE, 0.24; $t = 2.07$; $P = .04$) and drunkenness ($\beta = -.51$; SE, 0.26; $t = 1.97$; $P = .049$) at T2, whereas among T1 abstainers, the association of the intervention with frequency of alcohol use ($\beta = .10$; SE, 0.20; $P = .61$) and drunkenness ($\beta = .09$; SE, 0.17; $P = .61$) was nonsignificant. For past-year binge drinking, results did not reach significance of $P \leq .05$ among T1 abstainers ($\beta = .23$; SE, 0.14; $P = .11$) or T1 initiators ($\beta = -.40$; SE, 0.23; $P = .09$). Adjusted means and effect sizes for the moderated effects can be found in Table 3.

Discussion

Substance abuse preventive interventions implemented in early adolescence and before the need for treatment are widely advocated for their potential to delay initiation and reduce progression from use to abuse.¹ Adding to the limited evidence

Table 3. Intervention Effect Sizes for Moderated Effects

Outcome	Mean (SE) ^a				Cohen <i>d</i> ^b
	T1 Abstainers		T1 Initiators		
	Control	Bridges/Puentes	Control	Bridges/Puentes	
Alcohol use	2.77 (0.49)	2.87 (0.49)	3.75 (0.48)	3.24 (0.47)	0.43
Drunkenness	2.88 (0.59)	2.97 (0.55)	3.81 (0.55)	3.31 (0.53)	0.41
Binge drinking	2.05 (0.44)	2.28 (0.41)	2.89 (0.44)	2.49 (0.40)	NA

Abbreviations: NA, not applicable; T1, any substance use at baseline.

^a Means (SE) adjusted for covariate effects.

^b Effect size among T1 initiators.

directly supporting this potential, the present study offered evidence that a universal middle school intervention reduced alcohol misuse and disorder diagnosis in late adolescence, when most youths were in their senior year of high school. Whereas an association between the intervention and lifetime AUD emerged for the full sample irrespective of baseline substance use, the associations with past-year drinking and drunkenness were significant only for youth who had initiated substance use at the baseline assessment. Association with binge drinking varied between early abstainers and initiators but was not significant for either subgroup.

Adolescents randomized to Bridges/Puentes showed a 2.5-fold decrease in lifetime AUD, offering novel findings for a universal middle school intervention. Such findings are consistent with reviews concluding that the most promising EBIs are those that simultaneously increase youth resilience, promote effective parenting and family relationships, and include a focus on the school environment.^{46,68} Prevention of AUDs with a Mexican American sample is noteworthy given evidence of increased risk for this subgroup and because Latinos as a whole have less access and poorer response to substance abuse treatments.^{69,70} Joining Prado and colleagues,⁴³ who reported reduced AUDs with their high-risk sample, we conclude that culturally adapted family EBIs are beneficial in preventing more severe alcohol-associated problems of abuse and dependence and should be prioritized for large-scale implementation in Latino communities.

Sustained effects on alcohol use frequency and other indicators of misuse have been shown previously in middle school RCTs, particularly for combined parent-youth programs. However, prior findings have been mixed. Many EBIs that reduced alcohol use in the short term subsequently failed to show sustained benefits in high school when social norms favor frequent and excessive drinking, perhaps because the studies did not examine differential effects among higher-risk youths. Statistics show that early introduction of substance use increases the risk of dependence, presumably because early initiators are exposed to biological and environmental risks associated with early onset and later addiction. Early use also leads to neurologic changes during a vulnerable time of brain development that drive transition from occasional use to chronic misuse.⁷¹⁻⁷³ Many of these processes unfold through pathways targeted by Bridges/Puentes, for example, by affecting judgment, school engagement, and exposure to peer environments that reward risk-taking.⁷⁴⁻⁷⁷ We found that the intervention reduced the frequency of drinking and drunkenness but only for early initiators. These findings show that the youths who need intervention the most are benefitting. However, we did not find

5-year associations with binge drinking, perhaps because social norms favoring binge drinking may be difficult to change among Latinos.⁴³ However, because epidemiologic trends show that binge drinking is most prevalent somewhat later in young adulthood,⁷⁸ longer follow-up may be needed to fully evaluate any associations with binge drinking.

It could be argued that the reduced benefits for lower-risk youths might indicate that EBIs are less relevant for this subgroup and that targeted (ie, selective or indicated)¹⁰ interventions should be prioritized. However, the totality of benefits shown for Bridges/Puentes offers an important context for evaluating the public health significance of a universal approach. Bridges/Puentes was marketed in Title 1 schools to promote school success and demonstrated multiple benefits for Latino youths and their families, including increased school engagement that subsequently accounted for lower rates of school dropout.^{29,30,53,79,80} Findings herein on alcohol misuse and disorder combine with these previous findings to illustrate how universal programs can address a wide range of public health needs and, concurrently, reach higher-risk youth and families that may be more willing to enroll in nontargeted programs.^{46,47}

Limitations

Although low base rates of a disorder are a challenge in universal prevention trials, the moderate effect sizes for AUD in the RCT enabled us to detect associations with only 22 diagnosed cases (5.5% of the sample). However, power to test whether the intervention had stronger associations with disorder diagnoses for early initiators was limited and would have been strengthened by a larger sample, oversampling of high-risk youth, or longer follow-up when disorder rates would be higher. Despite favorable ratings indicating that the workshop condition served as a valid control, differences in program length cannot be ruled out as a contributing factor. Our Mexican American focus supported culturally tailored program delivery and addressed the gap in research with this subpopulation. However, this focus limits generalizability to other populations. The study also was limited to urban schools with high Hispanic enrollment and to families willing to enroll, which likely affects implementation processes and outcomes. Tests of effectiveness and implementation are needed to understand how the program would work across diverse schools and delivery settings.²⁰

Conclusions

Our results affirmed that a family-focused middle school intervention is a viable method to not only reduce substance

use initiation in the short-term, as our research and that of others previously have demonstrated, but also to reduce later rates of AUDs and alcohol misuse among Mexican American adolescents at heightened risk for problem drinking. Because even moderate reductions in adolescent drinking and AUD have the potential to reduce multiple other short- and long-term public health harms, these findings

argue for broad implementation. Future efforts are needed to develop the capacity and infrastructure of communities and schools to adopt and sustain culturally competent interventions, such as Bridges/Puentes, at scale and to ensure access for US Latinos who stand to benefit significantly from integrated efforts to simultaneously reduce alcohol and educational disparities.⁸¹

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REFERENCES

- US Department of Health and Human Services. *Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health*. 2016. <https://addiction.surgeongeneral.gov/>. Accessed July 15, 2017.
- Stueve A, O'Donnell LN. Early alcohol initiation and subsequent sexual and alcohol risk behaviors among urban youths. *Am J Public Health*. 2005;95(5):887-893.
- DeWit DJ, Adlaf EM, Offord DR, Ogborne AC. Age at first alcohol use: a risk factor for the development of alcohol disorders. *Am J Psychiatry*. 2000;157(5):745-750.
- Grant BF, Stinson FS, Harford TC. Age at onset of alcohol use and DSM-IV alcohol abuse and dependence: a 12-year follow-up. *J Subst Abuse*. 2001;13(4):493-504.
- Hingson RW, Heeren T, Winter MR. Age at drinking onset and alcohol dependence: age at onset, duration, and severity. *Arch Pediatr Adolesc Med*. 2006;160(7):739-746.
- Robins LN, Przybeck TR. Age of onset of drug use as a factor in drug and other disorders. In: Jones CL, Battjes RJ, eds. *Etiology of Drug Abuse: Implications for Prevention*. NIDA Research Monograph 156. Rockville, MD: National Institute on Drug Abuse; 1985:178-192.
- Hawkins JD, Oesterle S, Brown EC, et al. Sustained decreases in risk exposure and youth problem behaviors after installation of the Communities That Care prevention system in a randomized trial. *Arch Pediatr Adolesc Med*. 2012;166(2):141-148.
- Hawkins JD, Catalano RF, Arthur MW, et al. Testing Communities That Care: the rationale, design and behavioral baseline equivalence of the Community Youth Development Study. *Prev Sci*. 2008;9(3):178-190.
- Spoth R, Redmond C, Shin C, Greenberg M, Clair S, Feinberg M. Substance-use outcomes at 18 months past baseline: the PROSPER Community-University Partnership Trial. *Am J Prev Med*. 2007;32(5):395-402.
- Mrazek PJ, Haggerty RJ, eds. *Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research*. Washington, DC: National Academies Press; 1994.
- O'Connell ME, Boat T, Warner K, eds. *Prevention of Mental, Emotional, and Behavioral Disorders Among Young People: Progress and Possibilities*. Washington, DC: The National Academic Press; 2009.
- Brody GH, Chen YF, Kogan SM, Murry VM, Brown AC. Long-term effects of the Strong African American Families program on youths' alcohol use. *J Consult Clin Psychol*. 2010;78(2):281-285.
- Koning IM, van den Eijnden RJM, Verdurmen JEE, Engels RCME, Vollebergh WAM. A cluster randomized trial on the effects of a parent and student intervention on alcohol use in adolescents four years after baseline; no evidence of catching-up behavior. *Addict Behav*. 2013;38(4):2032-2039.
- Schinke SP, Schwinn TM, Fang L. Longitudinal outcomes of an alcohol abuse prevention program for urban adolescents. *J Adolesc Health*. 2010;46(5):451-457.
- Spoth R, Trudeau L, Guyll M, Shin C, Redmond C. Universal intervention effects on substance use among young adults mediated by delayed adolescent substance initiation. *J Consult Clin Psychol*. 2009;77(4):620-632.
- Spoth RL, Trudeau LS, Guyll M, Shin C. Benefits of universal intervention effects on a youth protective shield 10 years after baseline. *J Adolesc Health*. 2012;50(4):414-417.
- Spoth R, Redmond C, Shin C, Azevedo K. Brief family intervention effects on adolescent substance initiation: school-level growth curve analyses 6 years following baseline. *J Consult Clin Psychol*. 2004;72(3):535-542.
- Spoth RL, Randall GK, Trudeau L, Shin C, Redmond C. Substance use outcomes 5½ years past baseline for partnership-based, family-school preventive interventions. *Drug Alcohol Depend*. 2008;96(1-2):57-68.
- Flynn AB, Falco M, Hocini S. Independent evaluation of middle school-based drug prevention curricula: a systematic review. *JAMA Pediatr*. 2015;169(11):1046-1052.
- Hawkins JD, Oesterle S, Brown EC, Abbott RD, Catalano RF. Youth problem behaviors 8 years after implementing the Communities That Care prevention system: a community-randomized trial. *JAMA Pediatr*. 2014;168(2):122-129.
- Prado G, Pantin H, Briones E, et al. A randomized controlled trial of a parent-centered intervention in preventing substance use and HIV risk behaviors in Hispanic adolescents. *J Consult Clin Psychol*. 2007;75(6):914-926.
- Véronneau MH, Dishion TJ, Connell AM, Kavanagh K. A randomized, controlled trial of the family check-up model in public secondary schools: Examining links between parent engagement and substance use progressions from early adolescence to adulthood. *J Consult Clin Psychol*. 2016;84(6):526-543.
- Zonneville-Bender MJS, Matthys W, van de Wiel NMH, Lochman JE. Preventive effects of treatment of disruptive behavior disorder in middle childhood on substance use and delinquent behavior. *J Am Acad Child Adolesc Psychiatry*. 2007;46(1):33-39.
- Walton MA, Resko S, Barry KL, et al. A randomized controlled trial testing the efficacy of a brief cannabis universal prevention program among adolescents in primary care. *Addiction*. 2014;109(5):786-797.
- Foxcroft DR, Ireland D, Lister-Sharp DJ, Lowe G, Breen R. Longer-term primary prevention for alcohol misuse in young people: a systematic review. *Addiction*. 2003;98(4):397-411.
- Kellam SG, Wang W, Mackenzie ACL, et al. The impact of the Good Behavior Game, a universal classroom-based preventive intervention in first and second grades, on high-risk sexual behaviors and drug abuse and dependence disorders into young adulthood. *Prev Sci*. 2014;15(1)(suppl 1):S6-S18.
- Kitzman HJ, Olds DL, Cole RE, et al. Enduring effects of prenatal and infancy home visiting by nurses on children: follow-up of a randomized trial

- among children at age 12 years. *Arch Pediatr Adolesc Med.* 2010;164(5):412-418.
28. Olds D, Henderson CR Jr, Cole R, et al. Long-term effects of nurse home visitation on children's criminal and antisocial behavior: 15-year follow-up of a randomized controlled trial. *JAMA.* 1998;280(14):1238-1244.
29. Gonzales NA, Dumka LE, Millsap RE, et al. Randomized trial of a broad preventive intervention for Mexican American adolescents. *J Consult Clin Psychol.* 2012;80(1):1-16.
30. Gonzales NA, Wong JJ, Toomey RB, Millsap R, Dumka LE, Mauricio AM. School engagement mediates long-term prevention effects for Mexican American adolescents. *Prev Sci.* 2014;15(6):929-939.
31. Johnston LD, O'Malley PM, Miech RA, Bachman JG, Schulenberg JE. *Monitoring the Future: National Survey Results on Drug Use, 1975-2014—Overview, Key Findings on Adolescent Drug Use.* Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2015.
32. Swendsen J, Burstein M, Case B, et al. Use and abuse of alcohol and illicit drugs in US adolescents: results of the National Comorbidity Survey-Adolescent Supplement. *Arch Gen Psychiatry.* 2012;69(4):390-398.
33. Delva J, Wallace JM Jr, O'Malley PM, Bachman JG, Johnston LD, Schulenberg JE. The epidemiology of alcohol, marijuana, and cocaine use among Mexican American, Puerto Rican, Cuban American, and other Latin American eighth-grade students in the United States: 1991-2002. *Am J Public Health.* 2005;95(4):696-702.
34. Tschann JM, Flores E, Pasch LA, Marin BV. Emotional distress, alcohol use, and peer violence among Mexican-American and European-American adolescents. *J Adolesc Health.* 2005;37(1):11-18.
35. Blackwell DL, Lucas JW, Clarke TC. Summary health statistics for U.S. adults: National Health Interview Survey, 2012. *Vital Health Stat 10.* 2014; (260):1-161.
36. Gonzales NA, Germán M, Fabrett FCUS. Latino youth. In: Chang EC, Downey CA, eds. *Handbook of Race and Development in Mental Health.* New York, NY: Springer Publishing Co; 2012:259-278.
37. Prado G, Szapocznik J, Maldonado-Molina MM, Schwartz SJ, Pantin H. Drug use/abuse prevalence, etiology, prevention, and treatment in Hispanic adolescents: a cultural perspective. *J Drug Issues.* 2008;38(1):5-36.
38. Hecht ML, Marsiglia FF, Elek E, et al. Culturally grounded substance use prevention: an evaluation of the keepin' it R.E.A.L. curriculum. *Prev Sci.* 2003; 4(4):233-248.
39. Marsiglia FF, Ayers S, Gance-Cleveland B, Mettler K, Booth J. Beyond primary prevention of alcohol use: a culturally specific secondary prevention program for Mexican heritage adolescents. *Prev Sci.* 2012;13(3):241-251.
40. Martinez CR Jr, Eddy JM. Effects of culturally adapted parent management training on Latino youth behavioral health outcomes. *J Consult Clin Psychol.* 2005;73(5):841-851.
41. Pantin H, Prado G, Lopez B, et al. A randomized controlled trial of Familias Unidas for Hispanic adolescents with behavior problems. *Psychosom Med.* 2009;71(9):987-995.
42. Szapocznik J, Santisteban D, Rio A, et al. Family effectiveness training: an intervention to prevent drug abuse and problem behaviors in Hispanic adolescents. *Hisp J Behav Sci.* 1989;11(1):4-27.
43. Prado G, Cordova D, Huang S, et al. The efficacy of Familias Unidas on drug and alcohol outcomes for Hispanic delinquent youth: main effects and interaction effects by parental stress and social support. *Drug Alcohol Depend.* 2012;125(suppl 1): S18-S25.
44. Caetano R, Clark CL, Tam T. Alcohol consumption among racial/ethnic minorities: theory and research. *Alcohol Health Res World.* 1998;22(4):233-241.
45. Catalano RF, Hawkins JD, Berglund ML, Pollard JA, Arthur MW. Prevention science and positive youth development: competitive or cooperative frameworks? *J Adolesc Health.* 2002;31(6)(suppl): 230-239.
46. Jackson C, Geddes R, Haw S, Frank J. Interventions to prevent substance use and risky sexual behaviour in young people: a systematic review. *Addiction.* 2012;107(4):733-747.
47. Jackson CA, Henderson M, Frank JW, Haw SJ. An overview of prevention of multiple risk behaviour in adolescence and young adulthood. *J Public Health (Oxf).* 2012;34(suppl 1):i31-i40.
48. Spoth R, Greenberg M, Turrisi R. Preventive interventions addressing underage drinking: state of the evidence and steps toward public health impact. *Pediatrics.* 2008;121(suppl 4):S311-S336.
49. Velleman RDB, Templeton LJ, Copello AG. The role of the family in preventing and intervening with substance use and misuse: a comprehensive review of family interventions, with a focus on young people. *Drug Alcohol Rev.* 2005;24(2):93-109.
50. Hawkins JD, Catalano RF, Kosterman R, Abbott R, Hill KG. Preventing adolescent health-risk behaviors by strengthening protection during childhood. *Arch Pediatr Adolesc Med.* 1999;153(3): 226-234.
51. Lochman JE, Wells KC. The coping power program for preadolescent aggressive boys and their parents: outcome effects at the 1-year follow-up. *J Consult Clin Psychol.* 2004;72(4):571-578.
52. Van Ryzin MJ, Roeth CJ, Fosco GM, Lee YK, Chen IC. A component-centered meta-analysis of family-based prevention programs for adolescent substance use. *Clin Psychol Rev.* 2016;45:72-80.
53. Jensen MR, Wong JJ, Gonzales NA, Dumka LE, Millsap R, Cox S. Long-term effects of a universal family intervention: mediation through parent-adolescent conflict. *J Clin Child Adolesc Psychol.* 2014;43(3):415-427.
54. Castro FG, Barrera M Jr, Pantin H, et al. Substance abuse prevention intervention research with Hispanic populations. *Drug Alcohol Depend.* 2006;84(suppl 1):S29-S42.
55. Gonzales NA, Lau A, Murry VM, Pina A, Barrera MJ. Culturally adapted preventive interventions for children and youth. In: Cicchetti D, ed. *Developmental Psychopathology.* 3rd ed. Hoboken, NJ: John Wiley & Sons; 2016:874-933.
56. US Department of Education. Improving basic programs operated by local educational agencies (Title 1, Part A). 2017. <https://www2.ed.gov/programs/titleiparta/index.html>. Updated October 5, 2015. Accessed July 15, 2017.
57. Dillman Carpentier FR, Mauricio AM, Gonzales NA, et al. Engaging Mexican origin families in a school-based preventive intervention. *J Prim Prev.* 2007;28(6):521-546.
58. Szapocznik J, Coatsworth JD. *An Ecocultural Framework for Organizing the Influences on Drug Abuse: A Developmental Model of Risk and Protection.* *Drug Abuse: Origins & Interventions.* Washington, DC: American Psychological Association; 1999:331-366.
59. Spoth RL, Redmond C, Shin C. Randomized trial of brief family interventions for general populations: adolescent substance use outcomes 4 years following baseline. *J Consult Clin Psychol.* 2001;69(4):627-642.
60. Gonzales NA, Dumka LE, Mauricio AM, German M. Building bridges: strategies to promote academic and psychological resilience for adolescents of Mexican origin. In: Lansford JE, Deater-Deckard K, Bornstein M, eds. *Immigrant Families in Contemporary Society.* New York, NY: Guilford Press; 2007:268-286.
61. Eaton DK, Kann L, Kinchen S, et al; Centers for Disease Control and Prevention (CDC). Youth Risk Behavior Surveillance—United States, 2011. *MMWR Surveill Summ.* 2012;61(4):1-162.
62. Brener ND, Collins JL, Kann L, Warren CW, Williams BI. Reliability of the Youth Risk Behavior Survey Questionnaire. *Am J Epidemiol.* 1995;141(6): 575-580.
63. Shaffer D, Fisher P, Lucas CP, Dulcan MK, Schwab-Stone ME. NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): description, differences from previous versions, and reliability of some common diagnoses. *J Am Acad Child Adolesc Psychiatry.* 2000;39(1):28-38.
64. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders.* 4th ed. Washington, DC: American Psychiatric Association; 1994.
65. Fisher PW, Shaffer D, Piacentini JC, et al. Sensitivity of the Diagnostic Interview Schedule for Children, 2nd edition (DISC-2.1) for specific diagnoses of children and adolescents. *J Am Acad Child Adolesc Psychiatry.* 1993;32(3):666-673.
66. Martin CS, Winters KC. Diagnosis and assessment of alcohol use disorders among adolescents. *Alcohol Health Res World.* 1998;22(2): 95-105.
67. Muthén LK, Muthén BO. *Mplus User's Guide.* 6th ed. Los Angeles, CA: Muthén & Muthén; 2010.
68. Catalano RF, Berglund ML, Ryan JAM, Lonczak HS, Hawkins JD. Positive youth development in the United States: research findings on evaluations of positive youth development programs. *Ann Am Acad Pol Soc Sci.* 2004;591(1):98-124.
69. Alvarez J, Jason LA, Olson BD, Ferrari JR, Davis MI. Substance abuse prevalence and treatment among Latinos and Latinas. *J Ethn Subst Abuse.* 2007;6(2):115-141.
70. Substance Abuse and Mental Health Services Administration (SAMHSA). Hispanic subgroups differ in rates of substance use treatment need and receipt. The NSDUH Report. <https://www.samhsa.gov/data/sites/default/files/spot128-hispanic-treatment-2013/spot128-hispanic-treatment-2013.pdf>. Published October 24, 2013. Accessed January 26, 2018.

71. Giedd JN, Blumenthal J, Jeffries NO, et al. Brain development during childhood and adolescence: a longitudinal MRI study. *Nat Neurosci*. 1999;2(10):861-863.
72. Hanson KL, Medina KL, Padula CB, Tapert SF, Brown SA. Impact of adolescent alcohol and drug use on neuropsychological functioning in young adulthood: 10-year outcomes. *J Child Adolesc Subst Abuse*. 2011;20(2):135-154.
73. Squeglia LM, Tapert SF, Sullivan EV, et al. Brain development in heavy-drinking adolescents. *Am J Psychiatry*. 2015;172(6):531-542.
74. Caspi A, Elder GH. Emergent family patterns: the intergenerational construction of problem behavior and relations. In: Hinde R, Stevenson-Hinde J, eds. *Relationships Within Families*. Oxford, England: Clarendon Press; 1988:218-240.
75. Donovan JE, Jessor R. Structure of problem behavior in adolescence and young adulthood. *J Consult Clin Psychol*. 1985;53(6):890-904.
76. Hops H, Andrews JA, Duncan SC, Duncan TE, Tildesley E. Adolescent drug use development. In: Sameroff AJ, Lewis M, Miller SM, eds. *Handbook of Developmental Psychopathology*. Boston, MA: Springer; 2000:589-605.
77. Zucker RA, Chermack ST, Curran GM. Alcoholism: a life span perspective on etiology and course. In: Sameroff AJ, Miller SM, eds. *Handbook of Developmental Psychopathology*. 2nd ed. New York, NY: Kluwer Academic/Plenum Publishers; 2000:569-587.
78. Jager J, Keyes KM, Schulenberg JE. Historical variation in young adult binge drinking trajectories and its link to historical variation in social roles and minimum legal drinking age. *Dev Psychol*. 2015;51(7):962-974.
79. Wong JJ, Gonzales NA, Montaña Z, Dumka L, Millsap RE. Parenting intervention effects on parental depressive symptoms: examining the role of parenting and child behavior. *J Fam Psychol*. 2014;28(3):267-277.
80. Germán M, Gonzales NA, McClain DB, Dumka L, Millsap R. Maternal warmth moderates the link between harsh discipline and later externalizing behaviors for Mexican-origin adolescents. *Parent Sci Pract*. 2013;13(3):169-177.
81. Spoth R, Rohrbach LA, Greenberg M, et al; Society for Prevention Research Type 2 Translational Task Force Members and Contributing Authors. Addressing core challenges for the next generation of type 2 translation research and systems: the Translation Science to Population Impact (TSci Impact) Framework. *Prev Sci*. 2013;14(4):319-351.