

# 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.<sup>1</sup> 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.<sup>1,2</sup> 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).<sup>3-6</sup> 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.<sup>7-9</sup> Universal EBIs aimed at the general adolescent population<sup>10</sup> are especially appealing because they do not single out or label high-risk individuals, and they also promote bonding to school and community.<sup>11</sup>

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.<sup>12-16</sup> 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.<sup>14,16-18</sup> However, sustained effects on alcohol use are not consistently found.<sup>19</sup> Even in RCTs showing long-term reductions in the use of other drugs, adolescent drinking has been resistant to change,<sup>20-24</sup> with substantial variability across RCTs.<sup>25</sup> Furthermore, although long-term effects on AUDs are often reported for interventions targeted at younger ages when development may be more malleable,<sup>26-28</sup> 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.<sup>29,30</sup>

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,<sup>31,32</sup> and adolescents of Mexican descent report elevated rates relative to other racial/ethnic groups.<sup>33,34</sup> Latino disparities are particularly pronounced on 2 patterns of adolescent misuse—early initiation and binge drinking—that elevate risk for long-term negative consequences.<sup>35</sup> 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.<sup>36,37</sup> Culturally adapted EBIs address these risks, yet most have not reported long-term associations with alcohol misuse and disorder.<sup>38-42</sup> 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.<sup>43</sup> 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?

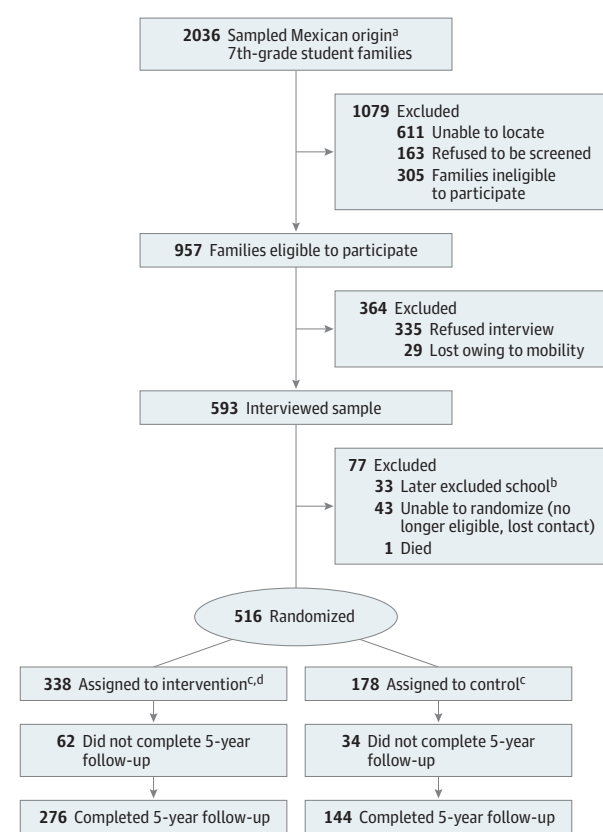
**Findings** In this follow-up of a randomized clinical trial that included 516 Mexican American adolescents, the 9-week middle school intervention significantly reduced the likelihood of an alcohol use disorder 5 years later. The associations of the intervention with the frequency of drinking and drunkenness 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.<sup>44</sup>

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.<sup>29,30</sup> 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).<sup>13,45-49</sup> Second, Bridges/Puentes targeted several key mediators responsible for sustained effects in prior EBIs,<sup>50-52</sup> including parenting practices and family dynamics, youth social-cognitive coping competencies, and school engagement.<sup>29,30,53</sup> Finally, Bridges/Puentes was adapted to address culture-specific risks and promote cultural strengths, consistent with extant EBIs for Latinos.<sup>54,55</sup> 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,<sup>11</sup> we hypothesized stronger associations for adolescents who initiated substance use at the baseline assessment.

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

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

<sup>b</sup> 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.

<sup>c</sup> 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.

<sup>d</sup> 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<sup>30,53</sup> 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.<sup>57</sup> 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.<sup>29</sup> Grounded in ecodevelopmental systems<sup>58</sup> and risk and protective factor<sup>10</sup> frameworks and modeled on the format of the Strengthening Families Program,<sup>59</sup> 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.<sup>60</sup> 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 South-western metropolitan area. The Figure shows the CONSORT diagram.

All schools had high Hispanic enrollment (69%-82%) and qualified for Title I status.<sup>56</sup> 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<sup>a</sup>

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 <sup>b</sup>				
None	166 (93.3)	307 (91.1)	$\chi^2_1 = 0.73$	.39
Any	12 (6.7)	30 (8.9)		
30-d Drunkenness, No. (%) <sup>b</sup>				
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) <sup>c</sup>	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

<sup>a</sup> Percentages reflect the percentage of each condition made up by members of the demographic group.

<sup>b</sup> Past 30-day alcohol use and drunkenness reflect any past month alcohol use and drunkenness.

<sup>c</sup> 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,<sup>61</sup> 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.<sup>47</sup> (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](#), 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 students<sup>62</sup>: 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?<sup>61</sup> 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,<sup>63,64</sup> 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.<sup>65,66</sup>

## 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<sup>a</sup>

Model	AUD		Alcohol Use		Drunkenness		Binge Drinking	
	$\beta$ (SE)	P Value	$\beta$ (SE)	P Value	$\beta$ (SE)	P Value	$\beta$ (SE)	P Value
<b>Main Effects</b>								
Intervention condition								
Adjusted <sup>b</sup>	-.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
<b>Moderated Effects</b>								
Adjusted <sup>b</sup>								
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.

<sup>a</sup> Unstandardized regression coefficients (SEs) reported.

<sup>b</sup> 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).<sup>67</sup> 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.<sup>1</sup> Adding to the limited evidence



Table 3. Intervention Effect Sizes for Moderated Effects

Outcome	Mean (SE) <sup>a</sup>				Cohen d <sup>b</sup>
	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.

<sup>a</sup> Means (SE) adjusted for covariate effects.

<sup>b</sup> 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.<sup>46,68</sup> 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.<sup>69,70</sup> Joining Prado and colleagues,<sup>43</sup> 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.<sup>71-73</sup> 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.<sup>74-77</sup> 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.<sup>43</sup> However, because epidemiologic trends show that binge drinking is most prevalent somewhat later in young adulthood,<sup>78</sup> 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)<sup>10</sup> 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 I 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.<sup>29,30,53,79,80</sup> 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.<sup>46,47</sup>

### 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.<sup>20</sup>

### 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.<sup>81</sup>

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