

# Cluster Randomized Trial of Teens Against Tobacco Use: Youth Empowerment for Tobacco Control in El Paso, Texas



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**Introduction:** This study examines smoke-free youth partnerships implementing the Teens Against Tobacco Use model developed by the American Lung Association. This innovative tobacco prevention strategy has not been evaluated rigorously. Students used peer teaching to educate youth about tobacco use and engaged in tobacco control advocacy activities. Participating high school and middle school youth were trained to develop and deliver tobacco prevention presentations to 4th–8th grade students in schools.

**Study design:** To evaluate the efficacy of the presentations, matched pairs of classrooms willing to have 1 presentation were randomly assigned to receive either the presentation first (intervention condition) or later in the school year (control condition).

**Setting/participants:** The study took place in a predominantly low-income Hispanic community. A total of 9 schools, 107 classes, and 2,257 students participated in the evaluation.

**Main outcome measures:** Tobacco susceptibility was assessed with a brief survey administered to students in both intervention and control classrooms in 2014 and 2015 after the completion of presentations in intervention classrooms. Analyses completed in 2019 compared intervention and control classrooms on tobacco susceptibility.

**Results:** Intent-to-treat analyses indicated that classrooms receiving a tobacco prevention presentation had significantly lower tobacco susceptibility scores than classrooms that did not receive a presentation (12% vs 17%,  $p < 0.01$ ), representing a 37% reduction in the odds of tobacco susceptibility. Teens Against Tobacco Use presenters also completed tobacco retailer compliance checks and gained media coverage in advocating to regulate e-cigarettes in the same manner as other tobacco products.

**Conclusions:** Findings suggest Teens Against Tobacco Use is an effective means of reducing tobacco susceptibility among 4th–8th graders in the immediate term. Longer-term outcome evaluations are needed to determine whether Teens Against Tobacco Use presentations can have a lasting impact on tobacco use.

**Trial registration:** This study is registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) NCT02443025.

*Am J Prev Med* 2019;57(5):592–600. © 2019 American Journal of Preventive Medicine. Published by Elsevier Inc. All rights reserved.

## INTRODUCTION

Tobacco use remains the leading cause of preventable death in the U.S., causing approximately 1 in 5 deaths.<sup>1</sup> With more than 80% of adult smokers starting before age 18 years, preventing adolescent tobacco use is critical.<sup>2</sup> People who start smoking as teenagers are more likely to become regular smokers and less likely to quit.<sup>3</sup> Furthermore, the

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0749-3797/\$36.00

<https://doi.org/10.1016/j.amepre.2019.06.013>

tobacco product landscape is diversifying, with use of products like e-cigarettes and hookah increasing. Thus, although cigarette use has declined, use of any tobacco product has been more stable and actually increased 38% among high school students and 29% among middle school students from 2017 to 2018.<sup>4</sup> For these reasons, youth tobacco prevention efforts remain essential.

This study examines a tobacco prevention intervention in El Paso, Texas (population, 678,266), which is on the U.S. border with Mexico, adjacent to Juárez (population, 1,428,508).<sup>5,6</sup> El Paso is predominantly Hispanic (82%), providing a unique opportunity to study the largest ethnic minority group in the U.S. Several factors may influence tobacco use in this region, including high rates of poverty and low educational attainment, which are linked to higher rates of tobacco use.<sup>7</sup> Although Hispanic adults have a lower prevalence of cigarette smoking than white non-Hispanics, Hispanic youth have higher prevalence of tobacco use, including e-cigarettes, than white non-Hispanics.<sup>8–10</sup> These trends may be because of acculturative processes, in which Hispanics who have more exposure to U.S. culture often adopt unhealthy behaviors, such as tobacco use.<sup>11</sup> Given the disparities in use, more research on Hispanic adolescent tobacco is needed.

Tobacco prevention interventions are often school based, using teachers to deliver information about the harms of tobacco use.<sup>12</sup> However, persuasive appeals from authority figures may incite message resistance, especially among higher-risk youth.<sup>13</sup> Peers may be more credible messengers, making peer-led interventions more effective than teacher-led interventions.<sup>14</sup> Use of narrative persuasion can also be more effective than traditional argumentation, as the narratives reduce message resistance and enhance emotional arousal, promoting message retention and recall.<sup>15</sup> Few evaluations of interventions employing these strategies, however, appear in the published literature, especially specific to Hispanic youth or low-income populations.

Teens Against Tobacco Use (TATU) was developed by the American Lung Association, the American Cancer Society, and the American Heart Association.<sup>16</sup> It uses an innovative youth–adult partnership approach that empowers youth to serve as both educators and health policy advocates.<sup>17</sup> The approach is potentially powerful because youth can relate to one another.<sup>18</sup> In advocacy efforts, youth can also garner media attention and sympathy, thus playing an important role in supporting policy change.<sup>19,20</sup>

In the TATU peer-teaching model, adult advisors recruit and train high school and middle school youth to develop and deliver tobacco prevention presentations to younger students. TATU members also engage in

tobacco control advocacy activities such as anti-tobacco social media campaigns and tobacco control policy initiatives.<sup>21</sup> The benefits of the program are twofold: teens who deliver tobacco prevention presentations develop stronger anti-tobacco beliefs and advocacy skills, and younger students receive anti-tobacco messages from credible peers. This study examines the latter, whether students receiving anti-tobacco messages from peers reduce their likelihood of tobacco use.

Youth work in small groups to develop tobacco prevention presentations where they share tobacco-related personal experience narratives and facilitate activities that encourage participants to share their own tobacco-related narratives. The approach is grounded in social cognitive theory, as the older youth promote observational learning via peer-led presentations that elicit peer stories about tobacco. As credible role models, the youth are culturally competent messengers that enhance audience self-efficacy to undertake similar behaviors.<sup>22,23</sup> Observational learning from the stories about the consequences of tobacco use shifts audience outcome expectations for tobacco use. The presentations change normative beliefs by raising student awareness of their peers' frequently negative views on tobacco and low rates of use. To increase knowledge, youth integrate a small number of compelling facts about tobacco harms into the presentation activities, such as that smoking a pack a day for 1 week leads to a loss of 1 day of life on average.<sup>24</sup>

The potential efficacy of TATU presentations also can be understood through narrative research, which suggests youth personal experience narratives persuade behavior change through several pathways.<sup>25</sup> First, cognitive engagement and emotional involvement with the narrative reduces counter-arguing and increases recall. Enhanced recall subsequently promotes cognitive rehearsal in discussing the story with others. Further, identification with the storyteller increases credibility and trustworthiness while decreasing counter-arguing.<sup>26</sup>

The goal of this study is to examine the impact of 1 TATU presentation on 4th–8th grader tobacco susceptibility. To achieve the evaluation goal, a cluster RCT was conducted. To minimize school disruption, randomization occurred at the classroom level rather than student level, with classrooms randomized to either receive the presentation first (intervention condition) or later in the school year after data collection was complete (control condition). The tested hypothesis was that students receiving a TATU presentation would have reduced rates of tobacco susceptibility. Study of TATU to prevent tobacco use is warranted because of its unique youth empowerment approach and the predominantly Hispanic, low-SES U.S./Mexico border context.

## METHODS

All schools enrolled in the study were Title I schools, serving predominantly low-income Hispanic students in central El Paso, Texas. The 2 middle schools, which served 6th–8th grades, had a combined total of 1,736 students, of which 95% were Hispanic and 85% received free or reduced-price lunch owing to low family income. The 7 elementary schools had a total of 3,895 students, of which 1,177 were 4th or 5th graders. Students at the elementary schools were 95% Hispanic, with 79% receiving free or reduced-price lunch.

This cluster RCT used parallel assignment, where classrooms were assigned to 1 of 2 arms using a balanced allocation ratio of 1:1. Classrooms in the treatment arm received TATU presentations, whereas classrooms in the waitlist control arm received teacher instruction as usual until after data collection was complete. To be eligible to participate in the study, teachers had to be willing to have a presentation about tobacco use in their classroom and to have a brief, anonymous tobacco survey administered to students. Once administrative approval from the principal of a school was obtained, all teachers agreed to participate, providing a 100% response rate at the classroom level.

Participating classrooms were grouped into matched pairs, with 1 randomly assigned to the intervention condition and the other placed in the control condition. For middle schools, classrooms were paired within a school based on grade level. There were 15 classes (455 students) in participating middle schools excluded before starting data collection for logistical reasons, as bus scheduling constraints prevented early morning TATU presentations and because presenting students needed a lunch break. For elementary schools, classes were paired within a school based on grade level and language (English or Spanish/English). If a particular school had an odd number of 4th or 5th grade classes, the unmatched class was randomly assigned to the treatment or control condition. If there was an odd number of classes in both the 4th and 5th grades, they were matched to balance the number of treatment and control classrooms within a school. After identifying participating classrooms and creating matched pairs, an individual unaffiliated with the study generated a random number using random.org for each matched pair and unmatched classroom to determine treatment condition.

Baseline collection of tobacco survey data occurred 1–19 days before the TATU presentations and follow-up data collection. Intervention classrooms received presentations first, whereas control classrooms conducted business as usual (receiving presentations after data collection). Following the presentation to the intervention classroom, it and its matched control classroom completed the tobacco survey. Although participants and data collectors were blinded to study conditions during the baseline data collection, they were not blinded at follow-up because the survey immediately followed presentations. There were no changes to the methods after trial commencement. All study procedures were approved by the lead author's IRB (HSC-SPH-14-0729). No adverse events were reported.

### Study Population

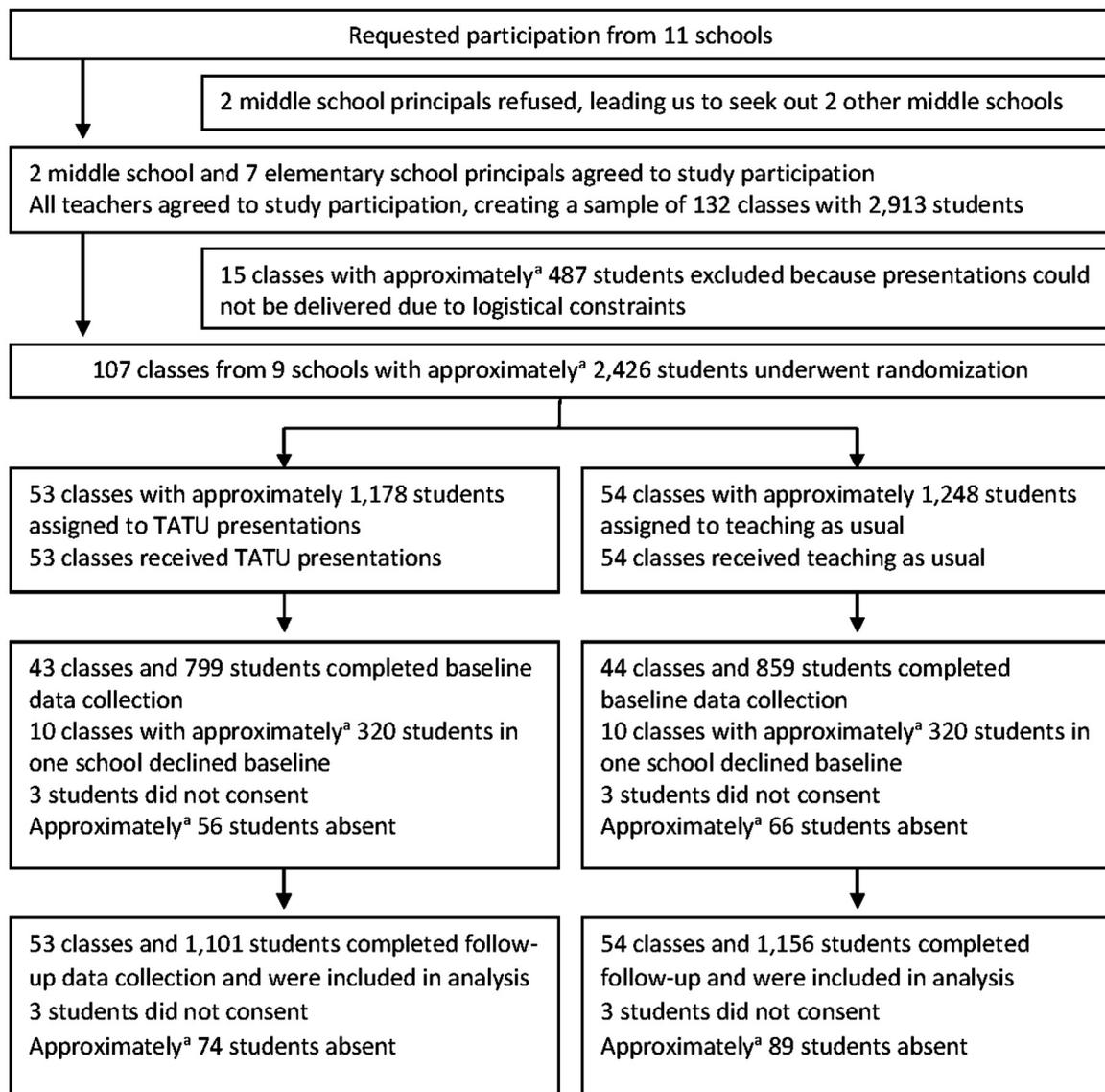
All students in participating classrooms were eligible to participate. Students unable to read English or Spanish would have been excluded but were not encountered during data collection. Because the tobacco survey was anonymous, passive parental

consent was used and 3 parents refused. Additionally, 3 students declined to complete the survey. The other reason for missing data was student absence. All data collection for this study took place in December 2014 and January 2015. As detailed in [Figure 1](#), a total of 1,658 students from 8 schools and 87 classrooms participated in the baseline data collection. One middle school (20 classes with approximately 640 students) opted out of the baseline data collection but participated in the intervention and follow-up data collection. A total of 2,257 students from 9 schools and 107 classrooms participated in the follow-up data collection, which occurred immediately after the TATU presentations. Based on student enrollment data, the 107 participating classrooms had 2,426 students, for a response rate of 68% at baseline and 93% at follow-up. The key determining factor for study sample size was the capacity of schools with TATU after-school programs to deliver presentations to nearby schools, which exceeded expectations used in the initial power analysis. Data collection ended as expected, after the delivery of all planned presentations.

The TATU intervention operated as an after-school program, with in-school tobacco prevention presentations delivered by youth involved in the after-school programs. Although evaluation focused on students receiving in-school presentations, TATU operated as an after-school program at 1 high school and 2 middle schools in central El Paso. The selected schools served a predominantly low-income population and had principals supportive of TATU. With administrative support, a teacher at each campus was identified to serve as coordinator. Over the summer of 2014, TATU coordinators attended a half-day training session provided by the American Lung Association to become certified TATU advisors. Coordinators also received a 2-day Advancing Youth Development training provided by Health Resources in Action. Both trainings helped the adult coordinators develop the skills needed to engage youth in a partnership and encourage their leadership in TATU implementation.

In September 2014, TATU coordinators recruited youth at their respective schools for an initial 6-hour Saturday kick off training, which focused on team building, the harms of tobacco use, secondhand smoke exposure, and presentation skills. The training sought to model icebreakers and educational activities the youth could use in their own presentations. After the training, youth worked in teams of 2 to 5 students to design 45-minute presentations focused on tobacco harms during weekly meetings with coordinators. The presentations emphasized the use of interactive and creative methods over didactic teaching. In an effort to promote presentation ownership, students could use activities and material from the training or create their own. Both the training materials and practice presentation feedback were aimed at helping students reach the measured outcomes. A project coordinator arranged for the youth to deliver the presentations in school classrooms in December 2014 and January 2015. High school youth presented to middle school physical education classes, whereas middle school youth presented to 4th and 5th graders at nearby elementary schools. The control classes received instruction as usual delivered by their primary teacher.

Along with the presentations, TATU groups pursued policy and environmental change initiatives for tobacco control. Youth attended and helped organize several tobacco prevention events, including a smoke-free parks cigarette clean-up event and the Texas Tobacco-Free Kids Day. After receiving training, youth also completed tobacco retailer compliance checks.



**Figure 1.** CONSORT flow diagram of classroom selection and allocation.

<sup>a</sup>Number of students by class is approximate because access to full enrollment data was not available. Access was available for total enrollment by school and by grade across sites, but some schools only provided approximations of the number of students in each classroom (i.e., 22–25 students). TATU, Teens Against Tobacco Use.

## Measures

The anonymous tobacco survey consisted of 12 Likert scale questions measuring tobacco susceptibility and 3 items measuring background information (gender, ethnicity, and school letter grades [e.g., mostly As, mostly Bs]). The survey was administered in English and Spanish, depending on respondent language preference.

Tobacco susceptibility (12 items,  $\alpha=0.75$ ) captured future tobacco use risk and was the primary outcome measure. The measure used 2 items from the Pierce et al.<sup>27</sup> measure of smoking susceptibility and 10 additional items drawn primarily from the Global Youth Tobacco Survey.<sup>28</sup> Most tobacco susceptibility items focused on tobacco generally (7 items), but 4 items focused on smoking

cigarettes and 1 item focused on e-cigarettes. The tobacco susceptibility measure was a composite of social cognitive theory constructs related to tobacco use behavior—outcome expectations (4 items,  $\alpha=0.46$ ; e.g., *Do you think you might enjoy smoking a cigarette?*), knowledge (3 items,  $\alpha=0.48$ ; e.g., *Do you believe that tobacco companies try to get kids under 18 to use tobacco products?*), normative beliefs (3 items,  $\alpha=0.60$ ; e.g., *About how many kids in your school use tobacco?*), and intentions (2 items,  $r=0.62$ ; e.g., *Do you think you will use any kind of tobacco in the next year?*). Items were on a 4-point Likert scale with 1=NO!, 2=no, 3=yes, and 4=YES! The last item (*About how many kids in your school use tobacco?*) was on a different 4-point scale, where 1=none of them, 2=some of them, 3=about half of them, and 4=most of them.

After the trial commenced, there were no changes to the primary outcome of tobacco susceptibility, which was computed as the mean of the 12-item scale, creating a continuous variable with a range from 1=NO! to 4=YES! During the data analysis phase, tobacco susceptibility was dichotomized as a yes/no variable to ease interpretation of findings. Respondents were classified as susceptible to tobacco use if their mean score on the continuous tobacco susceptibility scale was  $\geq 2$  ( $2=no$ ). Authors also decided to include the tobacco susceptibility subscales based on the previously described social cognitive theory constructs. Outcome expectations, knowledge, normative beliefs, and intentions were computed as dichotomous yes/no variables. Each scale was first computed the mean of its constituent items, which ranged from 1=NO! to 4=YES! Respondents were then classified as at risk for tobacco use if their mean score on the scale items was  $\geq 2$ . In total, findings on 6 outcome variables are presented: continuous tobacco susceptibility, dichotomous tobacco susceptibility, outcome expectations, knowledge, normative beliefs, and intentions.

### Statistical Analysis

Intention-to-treat analyses completed in 2019 tested the hypotheses that youth in the intervention classrooms would have lower tobacco susceptibility, with fewer students at risk based on their outcome expectations, knowledge, normative beliefs, and intentions, versus the comparison classrooms. Youth in intervention

and comparison classrooms were compared using regression models that controlled for baseline levels of the dependent variable within a classroom. Models also controlled for grade, as there were significant differences between intervention and comparison classrooms in the distribution of grade, owing to an inability to match on grade in elementary schools with an odd number of 4th or 5th grade classes. To ensure the model was specified correctly, interactions between the intervention condition and gender, ethnicity, language, grade, and letter grades were tested. These interaction terms were not significant and were dropped from the final regression models. Mixed-effects regression models accounted for the nesting of students within classrooms, and multiple imputation was used to estimate missing data caused by 1 school deciding not to participate in baseline data collection. All analyses were conducted with SAS, version 9.4.

## RESULTS

Among the 2,257 participants, most were female (1,159, 51%), Hispanic (1,656, 73%), and preferred a survey in English (1,808, 80%). Grade was the only covariate that significantly differed across study conditions (Table 1). The intervention condition had fewer 4th grade students (237, 22%) relative to the comparison condition (278,

**Table 1.** Frequency of Key Sample Characteristics by Exposure Group ( $n=2,257$ )

Characteristic	Intervention, <i>n</i> (%) ( $n=1,101$ )	Comparison, <i>n</i> (%) ( $n=1,156$ )	<i>p</i> -value
Gender			0.119
Girls	584 (53.0)	575 (49.7)	
Boys	500 (45.4)	562 (48.6)	
Missing	17 (1.5)	19 (1.6)	
Grade			<b>0.031</b>
4th	237 (21.5)	278 (24.0)	
5th	310 (28.2)	264 (22.8)	
6th/7th	325 (29.5)	367 (31.8)	
8th	229 (20.8)	247 (21.4)	
Language			0.998
English	882 (80.1)	926 (80.1)	
Spanish	219 (19.9)	230 (19.9)	
Letter grades			0.343
Mostly As	309 (28.1)	328 (28.4)	
Mostly Bs	462 (41.9)	449 (38.8)	
Mostly Cs	129 (11.7)	131 (11.3)	
Mostly Ds	29 (2.6)	32 (2.8)	
Mostly Fs	13 (1.2)	23 (2.0)	
Missing	159 (14.4)	193 (16.7)	
Ethnicity			0.387
Hispanic/Latino	820 (74.5)	836 (72.3)	
White, non-Hispanic	94 (8.5)	133 (8.6)	
African American	25 (2.3)	45 (3.9)	
American Indian	14 (1.3)	16 (1.4)	
Other	96 (8.7)	103 (8.9)	
Missing	52 (4.7)	56 (4.8)	

Note: Boldface indicates statistical significance ( $p<0.05$ ).

24%) and more 5th grade students (310, 28%) relative to the comparison condition (264, 23%). There were no significant differences between the intervention and comparison conditions on the outcome measures at baseline (Table 2).

Following the TATU presentation, intention-to-treat analyses indicated that significant differences between the intervention and comparison conditions emerged (Table 2). Specifically, the continuous tobacco susceptibility measure declined from 1.57 to 1.53 in the intervention condition and increased from 1.56 to 1.63 in the comparison condition (Cohen’s  $d=0.24$ , 95% CI=0.13, 0.34,  $p<0.001$ ). For the dichotomous tobacco susceptibility measure, the percentage of students classified as susceptible to tobacco use decreased from 17% to 12% in the intervention condition and increased from 14% to 17% in the comparison condition. This represents a 37% reduction in the odds of tobacco susceptibility for the intervention condition relative to the comparison condition (OR=0.63, 95% CI=0.46, 0.86,  $p=0.003$ ).

Similar patterns existed for the social cognitive theory constructs related to tobacco use—outcome expectations, knowledge, normative beliefs, and intentions. The percentage of students with risky outcome expectations for tobacco use at post-test was 19% in the intervention condition and 25% in the comparison condition, representing a 31% decrease in the odds of risky outcome expectations (OR=0.69, 95% CI=0.55, 0.87,  $p=0.002$ ). Similarly, the percentage of students with a lack of knowledge putting them at risk of tobacco use was 24% in the intervention condition and 31% in the comparison condition, thereby reducing the odds of risky knowledge by 33% (OR=0.67, 95% CI=0.53, 0.86,  $p=0.002$ ). Rates of risky tobacco use intentions were 11% in the intervention condition and 16% in the comparison condition at post-test, for a 32% reduction in the odds of risky intentions (OR=0.68, 95% CI=0.51, 0.89,  $p=0.006$ ). Rates of at-risk normative beliefs supportive of tobacco use were lower in the intervention condition than in the comparison condition (25% vs 28%); however, this difference was not statistically significant (OR=0.85, 95% CI=0.63, 1.16,  $p=0.31$ ).

Along with the tobacco prevention presentations, TATU involvement in policy and environmental change strategies for tobacco control was tracked. Highlights include the completion of 13 tobacco retailer compliance checks, identifying violations in 9 of 13 retailers. The team worked with retailers to help bring them into compliance.

Youth also spoke out in favor of a clean air ordinance at an El Paso City Council meeting and received coverage from the El Paso Times. The ordinance passed, regulating e-cigarettes like other tobacco products and prohibiting

**Table 2.** Outcome Differences Between Intervention (n=53 Classrooms, 1,101 Students) and Comparison Conditions (n=54 Classrooms, 1,156 Students)

Outcome	Pretest			Post-test			
	Intervention mean, % at risk (95% CI)	Comparison mean, % at risk (95% CI)	p-value	Intervention mean, % at risk (95% CI)	Comparison mean, % at risk (95% CI)	p-value	OR(95% CI)
Continuous tobacco susceptibility	1.57 (1.54, 1.60)	1.56 (1.53, 1.59)	0.76	1.53 (1.50, 1.57)	1.63 (1.60, 1.66)	<0.001	NA
Dichotomous tobacco susceptibility, %	17 (14, 19)	14 (11, 17)	0.17	12 (9, 14)	17 (14, 20)	0.003	0.63 (0.46, 0.86)
Normative beliefs, %	25 (22, 29)	26 (22, 30)	0.82	25 (21, 29)	28 (24, 32)	0.31	0.85 (0.63, 1.16)
Outcome expectations, %	20 (17, 23)	18 (15, 21)	0.25	19 (16, 21)	25 (22, 28)	0.002	0.69 (0.55, 0.87)
Knowledge, %	27 (24, 30)	30 (26, 33)	0.27	24 (20, 27)	31 (28, 35)	0.002	0.67 (0.53, 0.86)
Intentions, %	14 (11, 17)	11 (9, 14)	0.17	11 (9, 13)	16 (13, 18)	0.006	0.68 (0.51, 0.89)

Note: Boldface indicates statistical significance ( $p<0.05$ ). NA, not applicable.

the use of tobacco in parks and other public outdoor areas. TATU hosted a smoke-free parks cigarette clean-up event to raise awareness of the new ordinance. In addition to illustrating the extent of cigarette litter at the park, TATU recognized 2 city council members in attendance for their support of the clean air ordinance. The event was covered by a local TV news station.

## DISCUSSION

Findings from this RCT indicate the TATU presentations reduced tobacco susceptibility in a predominantly Hispanic, low-income sample of 4th–8th grade students. The Cohen's *d* effect size of 0.24 can be considered small but nonetheless meaningful, given that it is the result of a single TATU presentation.<sup>29</sup> Results from modeling tobacco susceptibility as a dichotomous yes/no variable, as has been done traditionally,<sup>30</sup> indicate that students receiving TATU presentations had a 37% reduction in their odds of tobacco susceptibility relative to the comparison condition. This finding suggests TATU has substantial promise as a preventive intervention, given previous research indicating that susceptibility is a strong predictor of subsequent smoking.<sup>31</sup> A strong conviction against tobacco use helps to ensure refusal despite the impulsive nature of adolescent decision making and the situational strength of peer influence.<sup>32</sup> If conviction waivers, risky situations such as social settings with alcohol consumption may lead to tobacco use.<sup>33</sup>

Along with the primary outcome of tobacco susceptibility, TATU led to significant reductions in the social cognitive theory targets of outcome expectations, knowledge, and intentions related to tobacco use. These findings are encouraging, as they provide a strong theoretic rationale for TATU efficacy. Given that the normative beliefs outcome was not statistically significant, presentations may need to explicitly raise awareness that most students do not use tobacco and typically hold negative attitudes toward use.<sup>34</sup> Future research with additional items for each social cognitive theory construct can improve the reliability of these measures and the precision of the intervention effect estimates.

One important consideration for TATU is its effect on e-cigarette use, the most common form of tobacco consumption among adolescents.<sup>35</sup> Although the tobacco susceptibility measure included an item about e-cigarettes, it mostly referenced tobacco generally. It is unclear how the measure relates to the use of specific tobacco products. The trainings covered e-cigarette harms and encouraged youth presenters to address this topic, although uptake varied across youth presentations. Future longitudinal research can estimate the influence of TATU on traditional and e-cigarette use.

The success of TATU in a predominantly low-income Hispanic population is noteworthy, as tobacco prevention studies among the largest minority in the U.S. are rare.<sup>34</sup> The use of local youth in the development and delivery of prevention messaging may help to enhance the cultural competency of TATU. Nevertheless, unique aspects of Hispanic culture may influence the efficacy of preventive interventions, such as the strong influence of family in youth decision making about tobacco use.<sup>34</sup> Future research with a more diverse sample can compare intervention efficacy across ethnic subgroups.

It is difficult to quantify the effect of TATU's policy and environmental change work. The authors' impression is that the youth voice was warmly received by city council members, who voted to adopt the tobacco control ordinance. Results indicate TATU youth were successful in attracting media attention on multiple occasions, which can influence public opinion and policy decisions.<sup>36,37</sup>

## Limitations

This study possesses a number of important strengths and some limitations. Key strengths include its use of a rigorous cluster RCT design and a large sample size. The main outcome measure, tobacco susceptibility, demonstrated good reliability and sensitivity to change in this study. Previous research demonstrated its validity as a predictor of future tobacco use among adolescents.<sup>27,31</sup> The self-reported nature of the outcome measure is an important limitation, along with the absence of tobacco use data. Furthermore, the sustainability of the effect on tobacco susceptibility is unknown. Future research with a longer follow-up timeframe and tobacco use outcomes can substantially strengthen confidence in TATU efficacy. Generalizability to other populations is unknown, but the success of TATU in a predominantly low-income and minority population suggests it may be effective with vulnerable populations.

It will be important to continually update the content of TATU to emphasize newer tobacco products. Beliefs about the harms associated with tobacco continually evolve and may have changed since 2014–2015 when data were collected. Updates and ongoing evaluation are especially critical in the current e-cigarette epidemic, as these products are promoted as a harm reduction strategy, widening their potential impact.

As an intervention strategy, the strengths of TATU lie in its use of credible role models and its emphasis on personal experience narratives. Although promising, reliance on youth messengers is also limiting in that they do not have the subject matter expertise or pedagogical experience of a full-time teacher. Thus, reliance on simple activities and presentation practice is essential. Additionally, it is unlikely that a single presentation will have a lasting

effect on tobacco use. More sustainable effects may require several uniquely compelling presentations delivered over time. A more structured multi-session curriculum that retains the personal experience narratives is under development.

## CONCLUSIONS

This study demonstrates that TATU is promising as a theoretically grounded universal preventive intervention that can shift outcome expectations, knowledge, and intentions against tobacco use. Its success in a predominantly low-income and Hispanic population is unique. TATU is also useful in cultivating the next generation of tobacco control advocates. The policy and environmental change initiatives can have a lasting influence on tobacco control. TATU's approach to youth engagement may also be an effective means of organizing youth around other health issues to deliver preventive interventions. Thus, this study represents an important step toward establishing an empowering and low-cost approach for the delivery of preventive interventions while adding the youth's voice to health policy advocacy initiatives.

## ACKNOWLEDGMENTS

The authors would like to thank Alisha Redelfs, Eric Estrada, and Jorge Ibarra for their contributions to study implementation. We are grateful to the many youth who participated in this study. Although Frank Bandiera is a U.S. Food and Drug Administration Tobacco Regulatory Science Fellow at the Center for Tobacco Products, this work was not done as part of his official duties. This publication reflects the views of the authors and does not represent agency position or policy. This work was supported by the Paso del Norte Health Foundation through the A Smoke-Free Paso del Norte initiative. Additionally, preparation of this article was supported, in part, by the National Cancer Institute through a Community Networks Program Center grant (U54 CA153505).

Dr. Brown led study design, implementation, data analysis, and write-up. Drs. Bandiera and Harrell supported report write-up. Some findings were previously presented in 2018 at the Annual Meeting of the Society for Prevention Research. The authors have no conflicts of interest or financial disclosures to report.

## SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <https://doi.org/10.1016/j.amepre.2019.06.013>.

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