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Theory- and technology-driven educational curricula addressing tobacco use

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Abstract

Project ASPIRE is an interactive computer-assisted technology designed to decrease smoking initiation among English- and Spanish-speaking students. Sixteen high schools were randomized to ASPIRE or standard-care. At 18-months follow-up, smoking initiation rates were lower in ASPIRE participants than controls. Project CASA was designed to reduce secondhand smoke (SHS) among Mexican-Americans through increased knowledge/awareness. Ninety-one households were randomly assigned into a fotonovela-based intervention or pamphlet-based standard care group. At the end of study, SHS exposure was lower among intervention households than controls. The use of these evidence-based resources offers potential for expanded tobacco control.

Keywords: Smoking, Secondhand smoke, Prevention, Exposure, Adolescent

Introduction: Tobacco use and exposure to secondhand smoke remain worldwide public health problems. We report two funded studies for bilingual participants (English and Spanish) utilizing interactive-computer-technologies and printed fotonovelas.

PROJECT ASPIRE: PREVENTING SMOKING INITIATION AMONG HIGH-RISK CULTURALLY DIVERSE ADOLESCENTS

Problem-Statement: Behavioral theories explain that a complex interplay of individual adolescent characteristics and socioenvironmental risk factors influence susceptibility to smoking initiation. Smoking prevention interventions may be strengthened by a greater understanding of these risk factors. Few studies have quantified cumulative risk factors for smoking initiation among adolescents. Results of one study found that the cumulative index was a significant predictor of health-risk behavior (1). For cigarette smoking the relative risk was 2.04, suggesting that for each additional risk factor identified, the likelihood of smoking initiation among adolescents doubled.

Purpose of Study: Computer-based smoking prevention and cessation interventions have rarely reported smoking abstinence at long-term (18-months post-recruitment), especially those responding to the needs of culturally diverse high school students at high risk for smoking. Project ASPIRE (A-Smoking-Prevention-Interactive-Experience) was designed, implemented and evaluated to address this objective.

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Methods: ASPIRE is a theoretically- and empirically-based interactive, multimedia smoking prevention and cessation curriculum based on the PRECEDE model (2). This model identifies the predisposing determinants of smoking behavior. These determinants were integrated into Transtheoretical model constructs using Intervention Mapping (3). The study was a nested-cohort, group-randomized, controlled trial designed to compare the effect of a CD-ROM-based intervention against the effect of a standard-care smoking cessation booklet. Sixteen inner city high schools comprised of mostly Hispanic and African American students were randomized to receive the ASPIRE curriculum or standard care.

Analytical Methods and Results: Ninety-five percent of participants were nonsmokers at baseline (1098 of 1160 who completed the 18-month survey). Smoking initiation rates were significantly lower in the ASPIRE compared to controls (1.9% vs. 5.9%, p<.05). The primary objective of these analyses was to evaluate whether the intervention had a differential effect on smoking initiation at 18 months follow-up for high-risk students. The following variables were tested as potential risk factors: depression, resistance to smoking, peer pressure and parental smoking using the exact logistic regression model. The exact unbiased estimates of odds ratios (95% confidence intervals) were used to summarize the results. Smoking initiation rates significantly lower in intervention compared to control among students with peer pressure (OR=3.3(1.4,8.9)), mother smoking (OR=15.0(2.3, ∞)) or father smoking (OR=4.9(1.5, 21.0)), lower resistance skills (OR=4.5(1.9,12.3)) and depression (OR=3.6(1.4,11.2)). A Cumulative Risk Factor Model was used to demonstrate the additive effects of multiple risk factors on smoking initiation. Risk factor approaches proposed by Baron, & Kenny (4) were utilized. A score of 1 was assigned for the presence and a score of 0 for the absence of each risk factor. The overall risk index was computed as a sum of the individual risk factor scores ranging from zero to 5. Figure 1 describes the prevalence of individual risk factors among students who completed the 18 month follow-up. Approximately 42% of students had 3 or more risk factors. As the level of risk increased there was a significant increase in smoking initiation in the control group, ranging from 2.7% to 17.2%, P<.001(Figure 2). In the intervention group smoking initiation rates remained stable over the risk index. There was a significant interaction effect between intervention group and risk level (F = 15.9; p<.001). These results demonstrate that ASPIRE impeded smoking initiation among high risk students.

![Figure 1: Percent Prevalence of Risk Factors for Smoking Initiation at Baseline](image1)

![Figure 2: Smoking Initiation by Risk Score](image2)
Conclusion: ASPIRE showed considerable promise in discouraging tobacco-use. The evidence-based program is available by internet access in the United States and internationally. Educators can offer the program at no cost to their middle and high school students. A sample of ASPIRE can be found at http://www.mdanderson.org/aspire. The ASPIRE curriculum aimed at smoking prevention provides an efficacious computer-based preventive option that actively engages middle and high school students.

PROJECT CASA (CLEAN-AIR—SAFE-AIR)

Problem-Statement: A recent report by the United States Surgeon General (5) details the mechanisms by which secondhand smoke (SHS) damages every organ in the body and how cellular damage and tissue inflammation from SHS occur immediately. SHS contains at least 250 toxic chemicals, including more than 50 that can cause cancer. In Texas, there are approximately 3000 deaths annually attributable to SHS exposure (6). Texas’ diverse population is 27% Mexican. Mexican Americans are a high-risk group for developing SHS-related illnesses and have limited access to healthcare (6,7).

Purpose-of-Study: Project CASA was designed to reduce SHS-exposure among Mexican-Americans through increased knowledge and awareness.

Methods: The study was a randomized controlled trial nested within a sizable cohort of Houston-area Mexican American households (Mano a Mano) maintained by the Department of Epidemiology at The University of Texas MD Anderson Cancer Center. Ninety-one households were randomized into two conditions. The first was the experimental Intervention (EI) where family members received a series of one comic book and two fotonovelas (illustrated storybooks) designed to promote tobacco-free indoor air environments. The second was standard care (SC) where family members received an American Cancer Society booklet. Evaluations were conducted at baseline, 6- and 12-month follow-ups. The primary outcome measure of SHS exposure was based on objective monitoring of SHS using passive diffusion nicotine monitors. Subjectively measured SHS exposures were based on responses regarding indoor smoking bans for each household, by the primary informants representing the family.

Analytical Methods and Results: Mixed model regression methods were used to model the mean ambient nicotine level over time. In addition to the main effects of intervention condition and time, the time by condition interactions were included as fixed effects in the model. Eighty-three percent (74 of 89 households) provided baseline as well as 6- and 12-month monitor data. In the room with the highest SHS exposure, longitudinal comparisons revealed a significant main effect for time with 12-month nicotine levels significantly lower than at baseline ($F = 13.6, p < 0.001$) (Figure 1). A significant time-by-condition effect ($F = 4.1; p < 0.05$) revealed a higher decrease in the mean ambient level in the EI condition from baseline to 12 than for the SC condition. At baseline all recruited households allowed smoking indoors. Longitudinal comparisons revealed a significant main effect for time ($F = 53.1, p < 0.001$) with percent of households that banned smoking at 12-month follow-up significantly higher than baseline (Figure 2).
Longitudinally comparisons revealed a higher increase in overall SHS knowledge in the EI group from baseline to 12-months than SC where no significant increase in knowledge was seen.

**Conclusions:** Our culturally relevant intervention has potential to substantially decrease SHS-related health problems in the target households. Results at 12-month follow-up revealed a strong initial impact of our program in terms of objectively and subjectively measured SHS exposure. Results will help in eliminating SHS from Mexican American households and in optimizing future culturally sensitive interventions.

**Figure 3:** Mean Ambient Nicotine Level in High Exposure Room

**Figure 4:** Percent of Households that Banned Smoking by Intervention Condition

**References**