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DIFFERENCES BY GENDER, ETHNICITY, AND ACCULTURATION IN THE EFFICACY OF THE *keepin' it* REAL MODEL PREVENTION PROGRAM*

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Abstract

This study examined whether the efficacy of *keepin' it REAL*, a model program for substance use prevention in schools, was moderated by gender, ethnicity, and acculturation. Gender differences in program efficacy may arise through boys' higher risk of drug use, inadequate attention to girls' developmental issues, or cultural factors like polarized gender expectations. Data came from a randomized trial in 35 Phoenix, Arizona, middle schools involving 4,622 mostly Latino 7th graders. Using multi-level mixed models and multiple imputation missing techniques, results for the total sample showed no gender differences in program effects on recent substance use, but the program was more effective in fostering boys' than girls' anti-drug norms. Subgroup analyses demonstrated several more beneficial program effects for boys than girls (less alcohol and cigarette use and stronger anti-drug norms), but only among less acculturated Latinos. There were no gender differences in program effects among more acculturated Latinos, nor among non-Latino whites.

Despite decades of research on youth prevention programs and their implementation nationwide, adolescent substance use continues at unacceptably high levels. Nationally, over 40% of 8th graders report lifetime use of alcohol, more than 25% report cigarette use, and more than 16% report marijuana use (Johnston, O'Malley, Bachman, & Shulenberg, 2006). Prevention efforts have focused most intensively on universal programs, typically delivered in schools and targeting early adolescence, when substance use initiation and experimentation accelerates. The most effective prevention strategies incorporate life-skills and normative training (Botvin, Schinke, Epstein, & Diaz, 1994; Hecht, Marsiglia, Elek, Wagstaff, Kulis, Dustman, & Miller-Day, 2003; Tobler & Stratton, 1997; Tobler, Roona, Ochshorn, Marshall, Streke, & Stackpole, 2000). Although universal programs are designed to serve an entire population (e.g., a community or school), and focus on a general risk level shared by all its members (Substance Abuse and Mental Health Services Administration [SAMHSA], 2003), individual risk for substance abuse can vary widely (Pentz, 1994).

A recurring question surrounding prevention programs is how much they vary in effectiveness depending on participants' substance use experience, substance use risk, and other individual characteristics. Studies have explored whether universal programs work

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equally well among youth from different ethnic backgrounds (e.g., Botvin, Griffin, Diaz, & Ifill-Williams, 2001; Kulis, Marsiglia, Elek, Dustman, Wagstaff, & Hecht, 2005). Although gender differences have been identified in the level of risk for substance use, and in its causes, progression, and consequences (Dakof, 2000; Ellis, O'Hara, & Sowers, 2000; Freshman & Leinwand, 2000; Guthrie & Low, 2000; Kauffman, Silver, & Poulin, 1997), few prevention programs have been tested for their efficacy across gender groups (Blake, Amaro, Schwartz, & Flinchbaugh, 2001). This study explored gender differences in the efficacy of *keepin' it REAL,* a universal substance use prevention program for middle school students.

GENDER DIFFERENCES IN SUBSTANCE USE RISK, RATES, INITIATION, AND PROGRESSION

While drug use rates have generally been higher for boys than for girls at all ages, the gap is narrowing for some substances (Blake et al., 2001; Dakof, 2000; Johnson & Mott, 2001; Kauffman et al., 1997; National Center on Addiction and Substance Abuse [NCASA], 2003). A national study of 8th, 10th, and 12th graders showed that although marijuana and stimulant use remains higher for boys than for girls, alcohol and cigarette use rates are now virtually identical for boys and girls at each grade level (Wallace Bachman, O'Malley, Schulenberg, Cooper, & Johnston, 2003). Although girls generally lag one-to-two years behind boys in substance use initiation, once substance use has begun, females progress faster from initial use to addiction when using the same dosage of substances (Kauffman et al., 1997; NCASA, 2003).

Several explanations for gender gaps in substance use have been advanced. Biological and socially constructed gender differences produce unique developmental trajectories for males and females, with concomitant risk, resiliency, and protective factors that lead to different substance use behaviors, and different motivations for using substances (Guthrie & Low, 2000; NCASA, 2003). First, the ecological transition (Bronfenbrenner, 1979) from elementary school to middle school is more difficult for girls than for boys in several respects. In puberty, girls experience special physical and emotional transformations, body image challenges, and increased peer conflict (LeCroy & Daley, 2001). The physical changes associated with puberty can be positive for boys, producing increased size and strength, but negative for girls (Vega & Gil, 1998). Adolescent developmental issues—particularly through changes in puberty—are thus a significant risk factor for substance use among girls, but less so for boys.

Second, in conjunction with noticeable body changes, early adolescence is particularly stressful for girls, as they must adopt new behaviors to comply with gender expectations inherent to their culture. Some girls experience low self-esteem and loss of "voice" as a result of social conditioning to suppress their self-expression as a means of maintaining important relationships (Spira, Grossman, & Wolff-Bensdorf, 2002). Girls are also more likely than boys to develop eating disorders and depression, and to experience sexual abuse, experiences that increase the risk for substance use (NCASA, 2003). Since problem behaviors rarely occur in isolation, the co-occurrence of these issues, along with their higher prevalence among girls, is likely to increase a girl's risk for substance use even further.

LINGUISTIC ACCULTURATION AND SUBSTANCE USE

Linguistic acculturation, or acquisition and use of English in place of the language of the culture of origin, is an important substance use predictor. Although language taps a single dimension of acculturation, it is comparable to multi-dimensional measures of acculturation, accounting for up to 65% of the variance in acculturation status (Rogler, Cortes, & Malgady,

1991; Samaniego & Gonzales, 1999). Studies of Latinos show that English proficiency is associated with higher rates of substance use, while continued use of Spanish at home is associated with less use (Epstein, Botvin, & Díaz, 2000,2001; Harrison & Kennedy, 1994; Zayas, Rojas, & Malgady, 1998). These findings suggest that the acquisition of English *when accompanied by* the loss of the language of origin may under-mine certain protective factors or create new risks, and more generally, that the development of a bicultural identity may be preferable to full assimilation to American culture because it preserves strengths emanating from the culture of origin (Castro, Boyer, & Balcazar, 2000; Duncan, Duncan, Biglan, & Ary, 1998; Flannery, Williams, & Vazsonyi, 1999).

Linguistic acculturation is closely linked to substance use for several reasons. First, Spanish language dominance limits the expansion of youths' peer networks to include English-speaking, American youth, who are known to use substances at higher rates (Warner, Valdez, Vega, de la Rosa, Turner, & Canino, 2006). Second, English language acquisition may introduce behaviors of the mainstream culture, including prodrug norms and prodrug images in the media, such as those depicting substance use as common (i.e., normal), sexy, and fun (Caetano, 1986; Dalton, Sargent, Beach, Titus-Ernstoff, Gibson, Aherns, Tickle, & Heatherton, 2003; Kilbourne, 1999). Third, youth who acquire English may face stress as they try to resolve cultural conflicts and use substances to reduce that stress (Barnes, 1979; Beauvais, 1998; Gil, Wagner, & Vega, 2000). For example, relative to their immigrant parents, youth commonly learn English more quickly and maintain less of their language of origin (Portes & Rumbaut, 2001; Xiong, Eliason, Detzner, & Cleveland, 2005). The resulting acculturation gap can under-mine parent-child closeness and parents' ability to monitor their children (Birman, Persky, Basu, & Pulley, 2004; Escobar, 1998). Finally, as ethnic minority youth learn English, they may be more aware of their minority status and ethnic discrimination. Internalization of ethnic stereotypes and prejudices may in turn lead to coping through substance use (Vega & Gil, 1998).

GENDER DIFFERENCES IN SUBSTANCE USE RISK BY ACCULTURATION STATUS AND ETHNICITY

Across cultures, gender differences in substance use risk and resilience may emerge in different ways or to different degrees. The "gendering" process teaches males and females what behavior is culturally appropriate for their gender and reinforces specific gender values (Guthrie & Low, 2000). The social implications of gender are reflections of specific cultures, among which ethnic cultures loom as particularly salient influences. In ethnic cultures that have traditional or highly polarized gender roles, such as Mexican culture, there are more pronounced gender differences in substance use (Kulis, Marsiglia, & Hurdle, 2003). Acculturation influences the extent to which a person adheres to the gender roles prescribed by the culture of origin, and thus, it influences the extent to which substance use norms and behaviors vary by gender.

In traditional Mexican culture, men are allowed great freedom to drink alcohol publicly while women are expected to drink modestly and only within safe boundaries set by male family members or partners (Wycoff, 2000). Mexican women are socialized to adopt a collectivist approach that promotes abstinence, stressing the risks that their substance use poses for family and friends while deemphasizing the value of their individual needs and desires (Perea & Slater, 1999). These well-defined and relatively rigid gender roles in Mexican culture carry over significantly into Mexican American culture (Kranau, Green, & Valencia-Weber, 1982).

However, in Mexican American communities, men seem to fit into traditional gender roles more readily than women do, especially with respect to career and family issues (Gonzalez,

1982). Attitudes toward gender roles and substance use can change during the acculturation process as the individuals adopt the gender and substance use norms of the dominant culture. These gender norms influence substance use among Mexican American youth, with the less acculturated showing the largest gender differences (Kulis, Marsiglia, & Hurdle, 2003). Among more acculturated youth, then, we may expect to find not only different substance use rates than among the less acculturated, but perhaps less pronounced gender differences in those use rates.

Acculturation to substance use norms in the United States has an especially strong impact on women (Caetano & Clark, 2003; Zapata & Katims, 1994). Immigrant women who drank little or no alcohol in their countries of origin show patterns of adopting the drinking norms of native born U.S. women from the majority culture (National Institute on Alcoholism and Alcohol Abuse, 1997). Among first generation Latinos in the United States, alcohol use changes more dramatically for females than males, in part due to their initially high rates of abstaining and low rates of heavy drinking (Collins & McNair, 2002). As less acculturated Mexican American women become more acculturated, they show a convergence in drinking status approximating the proportion of male drinkers (Alaniz, Treno, & Saltz, 1999). Abstinence rates decrease steadily for succeeding generations, such that drinking patterns for third generation Mexican Americans women are similar to in the general population, including occasional social drinking and problematic heavy drinking (Gilbert & Collins, 1997).

There are numerous explanations for these acculturation-linked changes in substance use, and their gendered nature. Acculturation weakens collectivism, increasing Mexican American women's alcohol use more than Mexican American men's use (Alaniz et al., 1999; Marsiglia & Waller, 2002; Randolph, Stroup-Benham, Black, & Markides, 1998). Acculturation changes behavioral norms that reflect traditional notions about gender, such as the values of *machismo* and *marianismo,* but these changes do not have the same ramifications for boys and girls. *Machismo* grants greater social freedom to boys than to girls while at the same time instilling a sense of responsibility and accountability. *Marianismo* restricts the social experiences of girls, emphasizes their family obligations, and subjects them to a greater degree of parental monitoring. Even in the absence of acculturation, Mexican American boys, relative to girls, have greater freedom of movement within their neighborhoods and peer networks and less familial monitoring. Although acculturation may further expand boys' social freedom and independence from parental control, for girls acculturation can set in motion profound social changes through access to a wider, more diverse set of social contacts, including those who espouse less conservative substance use norms. For these reasons, acculturation can lead to a gender convergence in substance use attitudes and behaviors among Mexican American adolescents, like the narrowing gender gap in the general population (Blake et al., 2001; Dakof, 2000).

GENDER AND PREVENTION

The question of whether there are gender differences in the effectiveness of substance use prevention interventions is relatively unexplored, and the existing knowledge is tentative. Our review of research about gender differences in the effects of model universal substance use prevention programs uncovered only two studies. Botvin (2000) found that gender moderated the effects of Life Skills Training in a rural Midwestern sample of adolescents, with desired program effects on social assertiveness and substance initiation among girls only (as cited in Lillehoj, Trudeau, Spoth, & Wickrama, 2004). Perry and colleagues (1996) of Project Northland, found no gender differences in program effects.

Despite the sparse evidence that universal prevention programs are differentially effective for female and male youth, numerous gender specific prevention programs addressing substance use have been developed. Two of the programs developed for girls only, Project Chrysalis and Friendly PEERsuasion, have been found effective in preventing the initiation of tobacco and alcohol use, respectively (NCASA, 2003). Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA), a team-centered program for female athletes in middle and high school, is effective in promoting resistance to drug offers and less use of diet pills (www.ohsu.edu/hpsm/athena.html). Go Grrrls, a primary prevention program for girls transitioning from adolescence to adulthood, has drug and alcohol lessons whose effectiveness has not yet been tested (LeCroy, 2004a,2004b). In contrast to these examples of programs for females, we found no gender specific substance use prevention programs targeting males exclusively.

The rationale for gender specific programs rests on recognized gender differences in substance use risk, etiology and progression, and their varying cultural expressions. These differences also suggest several reasons to expect that prevention programs may vary in effectiveness by gender. Substance use interventions have historically been designed for boys and men (Freshman & Leinwand, 2000; NCASA, 2003). This practice reflects the assumption that gender similarities are sufficient to warrant the use of male models and past research that documents a higher incidence of substance use among males than among females (Ellis et al., 2000). Prevention interventions may exhibit larger program benefits for males than for females because males generally are at higher risk of substance use at all age levels, despite the narrowing of the gender gap. The lower risk level of females may limit the ability of such interventions to show dramatic program benefits among them over a relatively short period.

A second reason to expect gender differences in program effectiveness is that programs may unwittingly adopt a male-oriented or gender-neutral model of substance use etiology and fail to address key determinants for females (Springer, Sambrano, Sale, Kasim, & Hermann, 2002). Even universal substance use prevention programs may have different effects on males and females because they do not address gender specific issues. A male-oriented or gender-neutral approach may be less effective in dealing with girls' unique set of adolescent stressors.

A third reason to expect gender differences in prevention effectiveness is that they will emerge among population groups with the most polarized differences in gender roles and expectations. As the gender gap in substance use narrows among those who enter society's cultural mainstream, gender differences in program efficacy may persist in ethnic and acculturation subgroups that reinforce strong gender differences in cultural expectations regarding substance use. These gender and substance use norms might change through acculturation as individuals adopt the dominant culture's gender and substance use norms.

keepin' it REAL

keepin' it REAL (Marsiglia & Hecht, 2005) is a school-based, substance use prevention intervention for middle school students that is a designated model program on the National Registry of Effective Programs of the U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration. The curriculum extends prior prevention models teaching drug resistance and life skills (Botvin et al., 2001) through a culturally-grounded, narrative based framework that incorporates diverse ethnic group values and practices promoting cultural protection against drug use (Castro, Proescholdbell, Abeita, & Rodriguez, 1999). Program elements were designed to preserve and strengthen anti-drug norms and attitudes, and to develop risk assessment, decision-making, and resistance skills. The program emphasizes four strategies used most often by adolescents to

resist substance offers—refuse, explain, avoid, and leave (Alberts, Miller-Rassulo, & Hecht, 1991; Moon, Hecht, Jackson, & Spellers, 1999)—whose first letters formed the acronym REAL in the program's name. These strategies include a simple "no" in response to offers of substances, providing a reason for refusing, and avoiding or leaving situations where substances may be offered.

Using a participatory action research approach, and drawing upon qualitative research on adolescents' drug resistance narratives, the program includes multi-faceted elements: 10 classroom lessons; 5 videos that were scripted, acted and filmed by students from a local high school; school booster activities employed after the classroom lessons; and a TV and radio public service announcement campaign (Gosin, Marsiglia and Hecht, 2003; Gosin, Dustman, Drapeau, & Harthun, 2003; Harthun, Drapeau, Dustman, & Marsiglia, 2002; Holleran, Dustman, Reeves, & Marsiglia, 2002). By incorporating students' perspectives in the curriculum, the prevention message reflected the local social, geographic, and cultural context of the participants. The curriculum received feedback from ethnically diverse teachers, was field tested in three 7th grade classrooms, and then revised based on observations of student reactions and delivery issues. The lessons are interactive, incorporating active involvement, exchange of ideas, and practice time for each lesson, and are delivered by regular classroom teachers who receive a one-day training.

A randomized trial of *keepin' it REAL* demonstrated that the program was effective in slowing use initiation and intentions to use substances (alcohol, cigarettes, and marijuana), in increasing use of effective drug resistance strategies, and in retarding the adoption of prodrug norms, positive substance use expectancies, and perceptions of widespread peer drug use (Hecht et al., 2003). The desired program effects persisted at intervals from 2 to 14 months following completion of the classroom lessons, and were largest for alcohol outcomes, the most commonly used substance. Heightened program efficacy was found for subgroups of students at relatively higher risk of initiating substance use, such as stronger program effects for more acculturated than for less acculturated Latino adolescents (Marsiglia et al., 2005).

As a universal program, *keepin' it REAL* was designed as a gender-inclusive intervention for both boys and girls. The current study systematically tests the program's applicability to both genders. Based on its deliberate design, which followed established prevention principles and targeted substance use by both male and female adolescents, there is no reason to expect significant gender differences in overall efficacy. Based on the literature reviewed above, however, we expect that if gender differences emerge, they will indicate greater program efficacy among boys and be moderated by ethnicity and acculturation status simultaneously.

DATA AND METHODS

A two-year randomized trial of *keepin' it REAL* began in Fall of 1998 in 35 Phoenix middle schools. More than 75% of the city's middle schools participated. Most schools (21/35) were in lower income Latino neighborhoods, but the sample also included schools in higher income, non-Latino white neighborhoods. All seventh grade students in the study schools participated after passive parental consent was obtained in compliance with university and school district human subjects policies. Prior to implementing the prevention program, students in intervention and control schools completed a baseline survey designed to assess their recent substance use experience, intentions, norms, and attitudes. These self-administered surveys, provided in back-to-back English and Spanish translations, were completed in classrooms on normal school days during regular classes. The Spanish version was translated and back-translated by native Spanish speakers to ensure accuracy. Both

versions were pilot tested with members of the target population prior to the official survey administration. Study staff, not teachers, administered the survey, ensuring that teachers did not influence students' responses. Although some students were absent on survey day, 87% of officially enrolled 7th grade students completed the survey.

Following the baseline survey, the *keepin' it REAL* classroom lessons and subsequent school boosters were implemented in the 25 intervention schools. The 10 control schools continued to implement their state mandated substance use prevention programs, selected by school officials from a list of research-based programs. Schools were assigned to intervention or control conditions through block randomization that controlled for the schools' size and ethnic composition. In late spring of 1999, approximately two months after the prevention curriculum was completed in treatment school classrooms, a follow-up survey was administered to all 7th grade students in all schools. All surveys contained repeated measures of substance use behaviors and outcomes so that treatment effects could be measured reliably.

SUBSTANCE USE OUTCOMES

The dependent variables include recent alcohol, cigarette, and marijuana use, and substance use norms. Frequency of recent use was measured by three questions that were used reliably in prior youth prevention work (Graham, Flay, Johnson, Hansen, Grossman, & Sobel, 1984) that asked how often in the past 30 days the student "had alcohol to drink (do NOT count for religious services)," "smoked cigarettes," and "smoked marijuana." Responses ranged from 1 = "none" to 6 = "16-30 days." According to these variables, 22% of the sample reported some recent alcohol use, 11% percent reported some recent cigarette use, and 12% reported some recent marijuana use, slightly higher than the extent of use reported at the national level: 17% alcohol, 9% cigarettes, and 7% marijuana (Johnston, O'Malley, Bachman, & Schulenberg, 2006). These baseline use rates meant that program efficacy would be gauged in large part by the program's ability to delay substance use initiation among non-users and preserve anti-drug norms among non-users and among users at lower risk for subsequent use. Because these variables had distributions skewed toward non-use, they were transformed with a natural logarithmic function, and the logged versions were used in the multiple regression models.

Substance use norms were measured by three variables capturing the extent to which the students felt it was OK for someone their age to drink alcohol, smoke cigarettes, or use marijuana. Responses ranged from 1 = "Definitely not OK" to 4 = "Definitely OK." Responses for the three substances were summed to form a scale with scores ranging from three to twelve.

The scale was created based on a measure by Hansen and Graham (1991) and had good reliability (alpha = .85).

Prevention Program Indicator and Individual-Level Measures

Our models include a treatment indicator, coded 1 if the school participated in the program and 0 otherwise. Twenty-five of the 35 schools were randomly assigned to the treatment condition; thus, about 75% of the student participants received the program.

Gender is captured by a dummy variable (1 = "male" and 0 = "female"). We use two additional well-established substance use predictors: academic performance and socioeconomic status (Bankston & Caldas, 1996; Gerard & Buehler, 1999). Academic performance was the students' self-reported usual grades (1 = "mostly F's" to 9 = "mostly A's"). Socioeconomic status was captured with a dichotomous variable indicating whether

the students received free or reduced price lunches through the federal school lunch program.

Race/ethnicity and linguistic acculturation was self-reported and then coded through dummy variables to identify three groups: More acculturated Latinos, Less acculturated Latinos, and non-Latino Whites. The study sample was over-whelmingly Latino (over 73%), with non-Latino whites as the second largest group (13%), and other race/ethnic groups having only minimal representation: African Americans at 8%, American Indians at 5%, and Asians at 1%. Because these three groups were a small portion of the sample, too few to analyze as separate subgroups, and too heterogeneous to combine into an interpretable "other" category, we excluded them from the analysis.

Latinos were further distinguished through two measures of linguistic acculturation that have been used in prior studies of acculturation and substance use (Epstein et al., 2000,2001): the language students usually spoke with family and with friends. Responses ranged from 1 = "Spanish only" to 3 = "Spanish and English equally" to 5 = "English only." Using the average of these two items, Latino students with scores of 3.0 or less were categorized as less linguistically acculturated, and those scoring greater than 3.0 were designated as more linguistically acculturated. Because virtually all non-Latino White students were English-only speakers, they were not distinguished by linguistic acculturation but were treated as a single, third subgroup.

Analytic Strategy

Because *keepin' it REAL* was designed to foster immediate behavioral and attitudinal changes, we test for gender's influence on program effects observed from baseline to the first post-test, an interval of from six to eight months. The tests examine post-test measures of recent substance use and anti-drug norms, adjusting for the same outcome measured at baseline.

The clustering of students in 35 schools is a potential cause of deflated standard errors. Therefore, we use multilevel or hierarchical modeling procedures (SAS Proc MIXED), allowing different schools to have different base levels of drug use, thereby accounting for the clustering and protecting against Type I error (Raudenbush & Bryk, 2002).

The number of Latino and non-Hispanic White students completing surveys prior to treatment was 3,605. Some attrition occurred at the second survey wave. Attrition was due most commonly to absence from school on survey day or moving to a non-participating school. To address missing data we use multiple imputation techniques (Allison, 2002) which have been used successfully in other efficacy studies (Graham, Roberts, Tatterson, & Johnson, 2002; Hecht et al., 2003). Imputation of unplanned missing data, such as missing items or subject attrition, requires the critical assumption that the data are missing at random MAR, conditional on other non-missing attributes. This assumption cannot be tested, but the assumption is made stronger by including all relevant predictors in an imputation model even if they are not used in the analyses.

Using SAS Proc MI, we created 10 complete datasets in our multiple imputation approach. The imputation models—the models predicting the missing values— included two sets of measures: 1) all dependent and independent variables that are used in the analyses; and 2) additional covariates of alcohol, cigarette, and marijuana substance use: the use of tobacco, uppers, and inhalants, educational aspirations, and English reading ability. We then analyzed the imputed datasets with complete-data methods and combined the results using Proc MIANALYZE to arrive at a single estimate that properly incorporated the uncertainty in the

imputed values. Because the three ethnic/acculturation subgroups were theorized to respond differently to the treatment, we examined them separately.

RESULTS

An analysis of the raw variables measuring the frequency of recent substance use revealed that among less linguistically acculturated students, 16% reported alcohol use, 8% reported cigarette use, and 8% reported marijuana use. Among more linguistically acculturated students, 25% reported alcohol use, 13% reported cigarette use, and 15% marijuana use. Among non-Latino white students, 19% reported alcohol use, 8% reported cigarette use, and 7% reported marijuana use. Contrary to patterns in a national youth sample showing more pervasive use of cigarettes than use of marijuana (Johnston, O'Malley, Bachman, & Shulenberg, 2006), the extent of cigarette use and of marijuana use was similar in each group. We attribute this finding to a statewide anti-smoking media campaign that co-occurred with the implementation of our intervention.

The descriptive statistics in Table 1 show significant variation in baseline substance use behavior and norms across gender, ethnicity, and acculturation groups. For recent substance use the means presented in the table are based on logged versions of the original variables, which were highly skewed toward non-use. Therefore, the means are interpreted only in relative terms. The highest levels of alcohol, marijuana, and cigarette use were among boys who self identified as Latino and were categorized as more linguistically acculturated based on their reported Spanish and English language use. This group also had the highest level of pro-substance use norms. The lowest levels of use and prodrug norms were found among non-Latino White girls. Within each ethnic subgroup (less linguistically acculturated Latinos, more linguistically acculturated Latinos, and non-Latino Whites), boys had higher substance use and pro-drugs norms than girls.

It is important to note in Table 1 that it is only among the less linguistically acculturated Latino group that boys were significantly more at risk than girls for all four outcomes. In the other subgroups, only in two of the four outcomes were boys at significantly higher risk. These simple descriptive statistics suggest that it is the less linguistically acculturated that have the widest and most consistent gender gaps in substance use and risk, making them the group most likely to demonstrate gender differences in the efficacy of the program.

We also briefly note some differences across subgroups in the remaining variables. The proportion of students participating in the *keepin' it REAL* treatment was approximately three-fourths in all subgroups; this lack of variability was expected because treatment was randomly assigned to schools. Grades tended to be higher among girls than boys, and higher among non-Latino Whites than the Latino groups. Lastly, the less linguistically acculturated Latino group was substantially more economically disadvantaged, with 95% of these students receiving free or reduced price school lunches. Fewer of the more linguistically acculturated Latinos received lunch assistance (83%), and less than half of non-Latino White students did.

Table 2 presents the multivariate tests of gender differences in program effects, with separate results for three groups: Less Linguistically Acculturated Latinos, More Linguistically Acculturated Latinos, and non-Latino Whites. To adjust for any baseline differences that might affect responses to the prevention program, the models control for the pre-treatment level of substance use frequency or adherence to prodrug norms, as well as for grades and SES, all measured at the pre-test. To test the hypothesis that the treatment was more effective for males, the models include variables for treatment, gender (male versus female), and an interaction between them. A significant coefficient for this interaction term

is evidence that the treatment effects differ between boys and girls. Because our substance use outcomes are coded such that more frequent drug use and stronger prodrug norms are coded as higher values, the male * treatment interaction term is predicted to be negative—indicating that the treatment is more beneficial for males in preventing increases in substance use and the adoption of prodrug norms.

The results for Less Acculturated Latinos, Models 1 through 4 in Table 2, are generally consistent with the hypotheses. In model 1, which examines post-treatment alcohol use, the treatment * male interaction term is significant and negative. This suggests that *keepin' it REAL* was significantly more effective in reducing male alcohol use than female alcohol use. Note that the correct interpretation of the significance of an interaction is based entirely on the significance of the interaction terms (Allison, 1977), and the lack or presence of significance of the first-order terms does not alter our original conclusion in the program's higher efficacy among males.

Most of the other variables in the models have effects as predicted by the literature. Pre-treatment alcohol use significantly affected post-treatment use because student behaviors are likely to be related over time. Grades had a significant protective effect; higher achieving students were less likely to use alcohol. Free or reduced lunch status, a proxy for socioeconomic status, was not significantly related to alcohol use.

Model 2 of Table 2 repeats the analysis for post-treatment marijuana use. As in the previous model, pre-treatment use significantly predicts post-treatment use, and higher grades are protective against marijuana use. In contrast to model 1, free or reduced lunch status is also protective against use. Another difference is that there is no significant gender difference in treatment effects. Although the coefficient is in the predicted negative direction, the treatment * male interaction is not significant ($p = .15$). In Model 3, however, there is a significant gender difference in the effect of the program on cigarette use. The negative treatment * male coefficient indicates that the program reduced cigarette use more for boys than for girls.

The outcome in model 4 differs from the previous models: it examines prodrug substance use norms rather than actual use. Such norms are an important dimension in the trajectory of student substance use. Even if students show little actual use of substances, they may still be at risk if they acquire prodrug norms. These norms accelerate the transition to use, and they create a social context of tolerance for peers who use substances and provide the student with drug use opportunities. Thus it is important to investigate how program effects vary for substance use norms as well as actual use. Model 4 provides evidence that the effect of the *keepin' it REAL* program on substance norms also varied by gender. Again, consistent with the results for actual use, the program was significantly more effective for boys than for girls among the less acculturated Latino students.

Recall that although we hypothesized the program would be more effective for boys, we expected these gender differences to be most apparent among the less acculturated Latinos. Among this subgroup, Latino cultural norms, such as strong disapproval of female substance use, are likely to be more widespread and enforced. Thus among the less linguistically acculturated Latinos, boys would be more at risk and perhaps more likely than their female counterparts to show desired program effects through a delay or reduction in substance use and in the adoption of prodrug norms. Although less acculturated girls may also be receptive to the messages in the *keepin' it REAL* program, the relative lack of risk of substance use in the control as well as treatment groups may attenuate measurable program effects.

Models 5 through 8 in Table 2, addressing program effects among more linguistically acculturated Latinos only, are consistent with our expectations. Unlike the less linguistically

acculturated Latinos, the more linguistically acculturated Latinos show no significant differences in treatment effects across gender. On the contrary, for the actual use of alcohol, marijuana, and cigarettes, the results suggest that the program may have been slightly more effective for girls: the non-significant interaction term is positive. However, in all the model tests involving more acculturated Latinos, the treatment * male coefficients are far from significant, and any inferences drawn from them are tentative and speculative.

Models 9 through 12, the last group of equations in Table 2, examine the remaining subgroup: non-Latino Whites. As with the more linguistically acculturated Latinos, the non-Latino Whites show no significant difference in treatment effects by gender, neither in substance use nor in prodrug norms. While the interaction effects are not significant, the directions of these coefficients are negative, which would mean that the program may have been more effective for boys than girls. It also must be noted that the sample size for the non-Latino white students was substantially smaller than the two Latino groups, which reduced the statistical power for detecting possible differences in program effects.

In addition to examining gender differences by subgroup, we conducted tests for gender differences in program efficacy for the entire sample (results not presented in tables). No significant gender differences in treatment effects were found for recent use of alcohol, cigarettes, and marijuana. The *p*-values for the treatment-by-gender interaction term predicting these three substance use outcomes were .99, .82, and .28, respectively. However, there were significant gender interaction effects on the adoption of prodrug norms ($p = .03$), with boys reporting stronger desired program effects than girls did. Recall that this outcome —pro-drug norms—was the only one where the direction of the treatment-by-gender interaction effects was the same for all three of the ethnicity/acculturation subgroups. The lack of evidence of significant gender differences in program effects on actual substance use in the total sample is not surprising. The subgroup analyses showed the program to be significantly more effective for boys among less linguistically acculturated Latinos, perhaps more effective (but not significantly) for girls among more linguistically acculturated Latinos, and perhaps more effective (but not significantly) for boys among White students. The results for the total sample obscure opposing gender effects and important differences, confirming the importance of examining these subgroups separately.

DISCUSSION

The randomized trial of *keepin' it REAL* provided rich data to test for gender differences in program effectiveness by including substantial numbers of students from ethnically and culturally distinct subgroups: less linguistically acculturated Latinos, more linguistically acculturated Latinos, and non-Latino Whites. As expected, there were no gender differences in program efficacy overall; instead, there was a pattern gender differences only in the subgroup that reflects more polarized gender roles—less linguistically acculturated Latinos. Among this group, the intervention was significantly more effective among boys than among girls in preventing increases in recent alcohol and cigarette use and in retarding the adoption of prodrug norms. No gender differences in program efficacy were found for any other subgroup.

The findings provide further evidence regarding relationships among gender, acculturation status and substance use. Less acculturated Latina and White girls were at the lowest level of risk. Their low baseline frequency of substance use suggests that less acculturated Latinas may be sheltered from substance use at least temporarily, possibly due to culturally prescribed, gender specific anti-drug norms and behaviors. However, their lack of exposure to and experience dealing with riskier situations may place them at greater risk than their White female counterparts at later developmental junctures. Although the effects of the

intervention were less pronounced for less acculturated Latinas than for their male counterparts—perhaps due to very low baseline drug use rates—their participation in the program may better prepare them for inevitable exposure to substance offers as they develop and acculturate.

Less acculturated Latino boys—with their higher baseline substance use rates and stronger prodrug norms—benefited more immediately from the intervention than their female counterparts. Without the intervention, these boys might influence their peers to adopt prodrug norms and begin substance use. The stronger desired program effects among these less acculturated boys may then yield later benefits by interrupting this peer influence.

The results of this study, while generally verifying the efficacy of gender-inclusive prevention strategies, also suggest that prevention efforts may be strengthened by attending to the special risks and resiliencies of certain subgroups of female and male youth. In particular, prevention research can be advanced by concentrating on ways to understand how and when to intervene with less acculturated Latinas so they may maintain the protective effects of culture of origin while navigating challenging acculturation and developmental processes.

Our tests for gender-by-treatment interactions among ethnic and acculturation subgroups do not present a complete portrayal of *keepin' it REAL*'s efficacy. Prior analyses showed the program to be highly efficacious overall among an ethnically diverse sample of adolescents, with substantial desired program effects on alcohol and marijuana use and many substance use mediators (Hecht et al., 2003). In addition, in analyses that did not investigate gender differences, the program was shown to be particularly effective among more acculturated Latino adolescents (Marsiglia et al., 2005), arguably because they are at higher risk of initiating or increasing substance use than less acculturated adolescents. In our results, both more acculturated Latino boys and girls reported the most frequent substance use and the strongest prodrug norms at baseline compared to both their less acculturated Latino and non-Latino White counterparts. The lack of appreciable gender differences among this higher risk group of more acculturated Latino adolescents provides support for *keepin' it REAL* as an efficacious universal program for youth most at need of effective interventions.

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Table 1

Variable Means, by Gender and Ethnicity/Linguistic Acculturation Status

	Less Linguistically Acculturated Latinos			More Linguistically Acculturated Latinos			Non-Latino Whites		
	Boys	**Girls**	**Differences**	**Boys**	**Girls**	**Differences**	**Boys**	**Girls**	**Differences**
Pre-Treatment Outcome Measure									
Alcohol frequency	1.47	1.36	.11 *	1.54	1.49	.05	1.42	1.26	.17 *
Marijuana frequency	1.33	1.15	.18 *	1.56	1.36	.20 *	1.23	1.11	.12
Cigarettes frequency	1.28	1.18	.10 *	1.31	1.26	.05	1.22	1.14	.07
Substance use norms	5.11	4.44	.67 *	5.47	4.85	.62 *	4.85	4.16	.69 *
Treatment Status:									
(1 = Treatment, 0 = Control)	.70	.69		.74	.73		.74	.72	
Grades	6.29	6.73		6.13	6.74		7.00	7.46	
Free/Reduced Lunch	.95	.95		.81	.86		.44	.44	
(1 = Y; 0 = N)									
N	818	809		725	708		293	252	

* Means for boys and girls on substance use outcome are significantly different (*t*-test, $p < .05$).

Table 2

Program Effects on Post-Treatment Substance Use Outcomes

	Less Linguistically Acculturated Latinos				More Linguistically Acculturated Latinos				Non-Latino Whites			
	1 Alcohol	**2 Marijuana**	**3 Cigarettes**	**4 Norms**	**5 Alcohol**	**6 Marijuana**	**7 Cigarettes**	**8 Norms**	**9 Alcohol**	**10 Marijuana**	**11 Cigarettes**	**12 Norms**
Treatment * Male	−0.10 * (0.06)	−0.05 (0.05)	−0.09 * (0.05)	−0.55 * (0.27)	0.13 (0.08)	0.03 (0.07)	0.05 (0.06)	−0.11 (0.36)	−0.09 (0.10)	−0.04 (0.08)	−0.09 (0.08)	−0.38 (0.33)
Treatment v. Control	−0.01 (0.04)	−0.01 (0.04)	−0.01 (0.04)	0.04 (0.21)	−0.14 * (0.07)	−0.04 (0.05)	−0.05 (0.04)	−0.06 (0.23)	0.02 (0.09)	0.08 (0.08)	0.05 (0.06)	−0.21 (0.26)
Male v. Female	0.11 * (0.05)	0.07 (0.04)	0.11 ** (0.04)	0.82 *** (0.24)	−0.08 (0.08)	0.02 (0.06)	−0.06 (0.05)	0.01 (0.31)	0.09 (0.09)	0.04 (0.07)	0.07 (0.06)	0.33 (0.27)
Pre-Treatment[a]	0.44 *** (0.03)	0.59 *** (0.03)	0.45 *** (0.03)	0.42 *** (0.03)	0.45 *** (0.03)	0.63 *** (0.03)	0.49 *** (0.03)	0.51 *** (0.03)	0.32 *** (0.06)	0.39 *** (0.09)	0.71 *** (0.05)	0.48 *** (0.05)
Usual Grades	−0.02 ** (0.01)	−0.03 *** (0.01)	−0.02 ** (0.01)	−0.12 ** (0.04)	−0.02 * (0.01)	−0.03 *** (0.01)	−0.02 *** (0.01)	−0.12 ** (0.04)	−0.05 *** (0.01)	−0.04 *** (0.01)	−0.02 *** (0.01)	−0.25 *** (0.05)
Free/Reduced Lunch	0.02 (0.06)	−0.17 *** (0.05)	−0.09 * (0.04)	−0.13 (0.30)	−0.02 (0.05)	0.02 (0.04)	0.00 (0.04)	−0.13 (0.19)	0.02 (0.05)	0.02 (0.04)	0.03 (0.04)	0.14 (0.14)
Intercept	0.26 *** (0.07)	0.44 *** (0.08)	0.28 *** (0.07)	3.56 *** (0.47)	0.46 *** (0.09)	0.37 *** (0.08)	0.34 *** (0.06)	3.76 *** (0.49)	0.51 *** (0.12)	0.38 *** (0.10)	0.21 ** (0.08)	4.29 *** (0.48)
N	1617	1617	1617	1617	1433	1433	1433	1433	545	545	545	545

Note: Estimates are from multilevel linear regression models with standard errors in parentheses.

[a] Pre-treatment and post-treatment measures are the same outcome assessed at two time points.

* $p < .05$.

** $p < .01$.

*** $p < .001$, one-tailed tests.