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Beyond Primary Prevention of Alcohol Use: A Culturally Specific Secondary Prevention Program for Mexican Heritage Adolescents

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Abstract

Classroom-based primary prevention programs with adolescents are effective in inhibiting the onset of drug use, but these programs are not designed to directly address the unique needs of adolescents at higher risk of use or already using alcohol and other drugs. This article describes the initial efficacy evaluation of a companion psychosocial small group program which aims at addressing the needs of Mexican heritage students identified by their teachers as being at higher risk for substance use or already experimenting with alcohol and other drugs. The adolescent (7th grade) small group curricula, *REAL Groups,* is a secondary prevention program which supplements the primary classroom-based substance use prevention program, *keepin' it REAL*. Following a mutual aid approach, a total of 109 7th grade students were referred by their teachers and participated in the *REAL Groups.* The remaining 252 7th grade students who did not participate served as the control group. To account for biased selection into *REAL Groups*, propensity score matching (PSM) was employed. The estimated average treatment effect for participants' use of alcohol was calculated at the end of the 8th grade. Results indicate that alcohol use decreased among students who participated in the *REAL Groups* relative to matched students who did not participate. These findings suggest that *REAL Groups* may be an effective secondary prevention program for higher-risk Mexican heritage adolescents.

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Keywords

Secondary prevention program; Substance use; *keepin' it REAL*; Propensity score matching

In 2010, approximately one-third (36%) of all 8th grade students in the United States reported drinking alcohol in their lifetime, and roughly 21% reported having used any illicit drug (Johnston et al. 2011). For adolescents, early onset of drug and alcohol use is associated with disruptions in family structure (Hayatbakhsh et al. 2008), low bonding to family, poor school performance, and more links to drug using peers (Robertson et al. 2003), and early onset of substance use leads to misuse and more persistent use in adulthood (Kandel et al. 1986; Grant and Dawson 1998; Ellickson et al. 2001). Among 8th grade students, Hispanic adolescents report higher substance use rates of both illicit (e.g., marijuana) and licit (e.g., alcohol) drugs than both African Americans and Whites (Johnston et al. 2010). Given that the 2008 US Census reports two-thirds of Hispanics are Mexican American (Pew Hispanic Center 2010), there is a growing need to investigate the efficacy of prevention programs with this population. To address this public health challenge, many school based programs have been designed with the purpose of preventing or delaying the initiation of alcohol and other drugs in adolescents; however, few have specifically addressed the needs of a higher-risk population and even fewer are culturally specific to Hispanic and Mexican heritage youth. The small group program described in this article evolved in response to the need for additional services for higher-risk youth in a large city of the southwest US participating in *keepin' it REAL,* a primary drug prevention program. *REAL Groups*, a culturally grounded secondary prevention program, aims to supplement the overall effectiveness of *keepin' it REAL* in preventing substance use, promoting anti-drug norms, and developing drug resistance strategies among more vulnerable Mexican heritage adolescents (Gosin et al. 2003).

Risk and Protective Factors for Substance Use

Early studies indicated that the failure of many substance abuse prevention programs was due to the lack of attention to risk factors associated with the early initiation of substance use (Bangert-Drowns 1988; Stuart 1974; Tobler 1986). Because adolescents are not only working to define their own identity separate from their parents but are placing greater importance on peer relationships (Steinberg and Morris 2001), substance use usually begins with experimentation in early adolescence and often in social settings with other substance using peers (Botvin and Griffin 2007). This experimentation gives adolescents an avenue through which they can mistakenly show both their independence from their family of origin and their solidarity with their peers (Botvin and Griffin 2007). Aspects of culture and the stress that results from acculturation, the adaptation of norms from the dominate culture, can also impact the nature and expression of substance use, suggesting that risk and protective factors may be experienced in a different way for Mexican heritage adolescents (Gil and Vega 2001; La Roche and Christopher 2009). Within a developmental and ecological framework, there is a need to move beyond the individual adolescent and consider family factors and peer influences that may be increasing adolescents' vulnerability for substance use and how these factors interact with culture.

Positive parental attitudes toward drug use, high levels of instability in the home, and low levels of family closeness have all been shown to increase the chances of an adolescent engaging in a variety of risky behaviors such as substance use (Brook et al. 1990; Wills et al. 1996; Schinke et al. 2008). While it has been found that children of divorced parents are more likely to engage in early substance use (Sartor et al 2007) this association has been attributed to conflict in the family rather than family structure per se (Farrington et al. 1985;

Barrett and Turner 2006). In addition, a lack of parental closeness has been identified as a risk factor for the early initiation of substance use (Brook et al. 1980; Urberg et al. 2005), attributed to the resulting absence of modeling and internalization of societal norms (Brook et al. 1990; Schinke et al. 2008).

For Mexican American youth, parental and family risk factors are similar but may manifest differently due to cultural norms and values in families. Mexican heritage adolescents tend to acculturate more rapidly than their parents creating a disparity in norms and values, which may lead to disruptions in communication (Santisteban et al. 1997). Generational differences in levels of acculturation have been found to cause stress and conflict within the family, which in turn, is related to an adolescent's likelihood of substance use initiation (Martinez 2006). On the other hand, Latino cultural norms such as *familismo,* the emphasis on the importance of relationships within the extended and immediate family, have been found to be protective against early substance use (Vega and Gil 1999; Marsiglia et al. 2005). Prevention programs have been developed that incorporate this knowledge regarding the intersection of risk, protection, and culture. One of these prevention programs is *Familias Unidas*, an effective community based substance abuse prevention program, which was designed to improve parent-child communication within the context of acculturation (Pantin et al. 2003). By addressing the interaction between risk factors and the cultural context, such programs address risks in a way that promote real change and decrease adolescent substance use.

As youth move through adolescence, relationships with peers become increasingly important (Steinberg and Morris 2001). Research has consistently found that peer influences are strongly associated with substance use. (Eggert et al. 1994; Cleveland et al. 2008; Senel et al. 2004). Associating with peers who use substances has been identified as an important indicator of substance use initiation (Barnes and Welte 1986; Spijkerman et al. 2007). For example, having close friends that smoke cigarettes is associated with higher levels of cigarette, marijuana and alcohol use (Marklein et al. 2009). For example adolescents who had three or more friends who smoke cigarettes are 24 times more likely to report being regular cigarette smokers themselves (Lloyd-Richarson et al. 2002). In addition, adolescents' beliefs that their peers are using and approve of using substances influence their overall attitude toward substance use (Zamboanga et al. 2009; Marklein et al. 2009). Botvin (1990), in a review of substance abuse interventions, found that interventions that taught students effective ways to resist social pressures from their peers were successful in reducing substance use.

For Mexican heritage youth, in addition to creating family conflict, acculturation may also impact adolescent drug use behaviors through associations with peers that may have more pro-drug norms (Santisteban et al. 2003; Gil, et al. 2000; Coatsworth, et al. 2002). In school, acculturating Mexican heritage adolescents often encounter normative American culture, which has been found to be more pro-substance use (Escobar 1998). In an effort to identify with non-Latino peers or "fit in" with the dominant culture, Mexican heritage youth may be motivated to initiate substance use or place themselves in situation where substances are begin used (Marsiglia et al. 2004). *keepin' it REAL,* a school based culturally grounded prevention program, addresses peer norms and has been show to be more effective at reducing pro substance use attitudes and behaviors and overall reported substance use among Mexican American youth (Marsiglia et al. 2005). Providing youth with anti-drug messages from peers within their culture of origin, *keepin' it REAL* reinforces cultural anti-drug norms through culturally specific narratives, actively engages youth in the prevention effort, and provides them with skills to communicate their intentions effectively.

Primary and Secondary Substance Use Prevention Programs: keepin' It REAL and REAL Groups

Most prevention programs have been universal in scope, designed for all adolescents regardless of risk or need, and although it has been suggested that secondary prevention is needed, evidence of effective programs targeting higher-risk youth is sparse and inconclusive.

In a recent review of 136 adolescent school-based substance use prevention programs, only 11 targeted higher-risk youth (Gottfredson and Wilson 2003). Although no further information was provided regarding the specifics of these 11 programs, the authors conclude that while cognitive behavioral approaches may show promise in preventing substance abuse in at-risk populations, the effects of general secondary prevention programs are inconclusive and in need of further study (Gottfredson and Wilson 2003).

More frequently, secondary prevention programs have been used to address delinquent behavior (Moffit 1993). In a meta-analysis of school-based programs that address delinquent behavior, programs that only included higher-risk youth were found to be more effective than programming that was inclusive of all students (Wilson et al. 2001). While this larger effect may be due to high rates of problem behaviors prior to the prevention programming, thus giving students more room to improve, these findings warrant attention and suggest that secondary prevention programs may be more efficacious in changing behavior among higher-risk youth. In addition, secondary prevention efforts are being implemented as a cost-effective way of addressing academic failure. The response to intervention (RTI) approach identifies students at high risk of academic failure, monitors their response to the universal instruction, and provides them with additional support and resource if they are not progressing as expected (Fuchs and Fuchs 2006). While studies testing the effectiveness of primary prevention programs indicate that secondary prevention programs are needed for higher-risk youth, little research has been done in this area.

Levels of substance abuse prevention should match the progression of substance use, level of risk and the developmental stage of the individuals being targeted (Botvin and Griffin 2007). Although most substance use prevention programs focus on the entire population, with little attention paid to providing additional support to higher-risk students, research into general anti social behavior and school violence suggests that having a secondary prevention program may decrease anti social behaviors, including drug use behaviors (Eggert et al 1994; Walker and Shinn 2002). Walker et al. (1996) suggest that the same approach is needed for substance abuse prevention. Multi-leveled school prevention, addressing not only universal needs through primary prevention but also selective need or risk factors with secondary prevention programming, is crucial to reducing substance use among adolescents (Johnson et al. 1990).

In order to address the specific needs of higher-risk students, *REAL Groups* (Marsiglia et al. 2010) was developed as companion program to *keepin' it REAL*, (Marsiglia et al. 2005; Hecht et al. 2003), a culturally grounded school-based primary prevention program recognized by the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA) as a model program. *keepin' it REAL* builds on the protective nature of culture and addresses risk factors specific to a multicultural middle school population. The main premise of this primary prevention program is that many adolescents initiate substance use not because they desire to use alcohol and other drugs but rather they lack the necessary social skills to successfully resist drug offers (Gosin et al. 2003). Therefore, in order to prevent substance use, *keepin' it REAL* develops and builds the adolescents' capacity to resist drug offers with the REAL (Refuse, Explain, Avoid, and Leave) resistance strategies.

As a universal prevention program (SAMHSA 2003), *keepin' it REAL* takes place in regular school classrooms with students with varying degrees of substance use risk.

Addressing the variation in risk among individual students and specifically targeting adolescents that appear to be at higher risk for substance use, the program developers designed *REAL Groups*. Like *keepin' it REAL*, *REAL Groups* follows a culturally grounded orientation—that is, the lessons taught are rooted in the cultural values and norms of the community of origin (Marsiglia and Kulis 2009). The *REAL Groups* prevention program (Marsiglia et al. 2010) aims at making explicit deeply held cultural values and potential value conflicts (Bogenschneider 1996; Castro and Alarcón 2002; Hair et al. 2002; Masten and Coatsworth 1998). Delivered by masters-level social work graduate students who received intensive training in the manualized curriculum, adolescents learn how to integrate and discuss norms and values of their culture of origin; in this case, Mexican/Mexican American culture- as a resource or strength protecting them from drug use. In keeping with the developmental needs and assets of the targeted age group, *REAL Groups* addresses peer relationships and interactions, prosocial behaviors, school and neighborhood adjustment, and group membership issues (Masten and Coatsworth 1998; Phinney et al. 2001a, b, c).

The participants of *REAL Groups* receive the 10-week primary prevention program, *keepin' it REAL*, and, in addition, take part in the 8-week psychosocial group, comprised of approximately 10 adolescents per group. The classroom-based 10-week *keepin' it REAL* curriculum includes lessons on the four drug resistance skills (Refuse, Explain, Avoid, and Leave), drug norms, refusal self-efficacy, and developing decision making skills (see Gosin et al. 2003). The small group, 8-week *REAL Group* sessions encourage students to discuss, rehearse, and apply these REAL resistance strategies to real-life situations connected with aspects of their culture of origin that protect them from risk, such as culturally supported anti-drug norms. Topics in the 8-week psychosocial sessions include (a) fostering mutual support in relationships, (b) identifying and asserting personal needs linked to culture of origin, (c) balancing individuality with inclusion, (d) valuing the self and the history of migration, (e) valuing the self as a resource to others, (f) maintaining a vision of the future and acting to realize that vision, (g) cultivating a sense of belonging, and (h) connecting with support networks (see Marsiglia et al. 2010). Students learn together, support each other, author their stories, and rehearse options and choices consistent with cultural norms learned at home and in their communities (Arrington and Wilson 2000). The group sessions provide members with opportunities to discuss, address, explain, clarify and redefine misconceptions and stereotypes about them and their communities of origin. Exposure to acculturation, acculturation stress and ethnic discrimination have been identified as putting adolescent Mexican heritage youth in the Southwest at higher risk for use of alcohol and other drugs and are directly addressed in the small group intervention (Kulis et al. 2009; Marsiglia, et al. 2005).

The *REAL Groups* curriculum is based on the mutual aid approach to group work and the importance of developing social group norms (Gitterman and Schulman 2005). Mutual aid draws on resilience research, which highlights the value of social support networks and reciprocity in protecting adolescents from negative outcomes and in facilitating their successful development (Bernard 2004; Lee 1986). Connections, relationships, and social networks provide the social capital needed to support adolescents through their school adjustment process and in the case of immigrant adolescents through their acculturation process (Stanton-Salazar 2001; Stanton-Salazar and Spina 2003; 2005). Group members learn to identify shared values connected to their culture of origin and at the same time, learn how to share with each other possible contradictions they experience between home, school, and peers' expectations. This approach allows group participants to contextualize risky

situations by identifying challenges, protective factors, and in the case of the *REAL Groups*, learn and rehearse specific drug resistance strategies within a cultural context. The *REAL Groups* program was originally designed and evaluated with 5th grade students, and the original study did not provide conclusive results, in part, due to low use rates of the young participants and the related lack of statistical power (Marsiglia et al 2010). The current study reports on the results of its adaptation and implementation with 7th grade students.

Aim of This Study

The aim of this study is to test the efficacy of *REAL Groups* as a secondary substance use prevention program and companion to the primary prevention program, *keepin' it REAL*. We hypothesize that higher-risk 7th grade students who participate in both *REAL Groups* and *keepin' it REAL* will have significantly less alcohol use by the end of 8th grade compared to their matched 7th grade higher-risk counterparts who only participate in the classroom based primary prevention, *keepin' it REAL*.

Methods

Sample

Data for this study come from a 5-year randomized control trial of *keepin' it REAL* that surveyed 3,038 students from 30 public middle schools in Phoenix, Arizona and was funded by the National Institute on Drug Abuse. The participating schools had a majority of Mexican heritage students (73%) and students receiving free or reduced school lunches (90%). Following both university and school district policies for human subject protection, active parental consents were obtained from an estimated 82% of enrolled students. For each wave of data, a classroom-based questionnaire was administered to consented students by university-trained survey proctors. The classroom-based questionnaire, available in both English and Spanish, asked students about their substance use, drug offers, drug expectations, drug norms, acculturation, ethnic identity, and demographic characteristics. For more information on the full 5-year randomized control trial of *keepin' it REAL*, see Marsiglia et al. (2011). At the beginning of the 5-year randomized control trial, all 30 schools were randomized into four conditions: (1) a control group; (2) schools receiving a version of *keepin' it REAL* in 5th grade only; (3) schools receiving a version of *keepin' it REAL* in 7th grade only; and (4) schools receiving a version of *keepin' it REAL* in 5th and 7th grade. Of the 30 public middle schools participating in the full 5-year randomized control trial (n=3,038), 6 schools were assigned to condition 3, receiving a version of *keepin' it REAL* in 7th grade only and were selected to participate in *REAL Groups* (n=361). Like the full sample, this subsample of six schools contained a majority (67%) of Mexican heritage students and students receiving free lunch or reduced school lunch (88%). The consent rate for these six schools was an estimated 87% of enrolled students.

While all of the 361 students in these six schools received the classroom-based primary prevention program, *keepin' it REAL* during their 7th grade school year, a total of 109 7th grade students in these six schools were referred to and participated in *REAL Groups* during their 7th grade school year as well. For a detailed description of the participants, please refer to Table 1. In order to participate in *REAL Groups,* students needed to be referred by their classroom teacher through a 10-item referral form, modeled after the Search Institute's list of developmental assets for middle childhood (2004). Teachers referred students with known or suspected substance use, exposure to substance use through family members, lower social skills, and a poorer self-image.

The 109 students who participated in *REAL Groups* also completed the classroom-based self-administered questionnaire as referenced above for the entire 5-year randomized control

trial. The data for this study are drawn from these self-administered classroom-based questionnaires at the beginning of 7th grade and at the end of 8th grade. All students in the six schools (n=361) completed the questionnaire at the beginning of 7th grade in Fall of 2006 before the prevention program. During the remainder of students' 7th grade year (Fall of 2006 into Spring of 2007), the prevention programs, both *REAL Groups* and *keepin' it REAL*, were delivered. Questionnaires were then administered at the end of students' 8th grade year (Spring of 2008). In order to test the efficacy of *REAL Groups*, a nonexperimental, post hoc matched-pair design was used, as discussed later in more detail. As such, the starting sample size for this study equaled 361 students: 109 *REAL Group* students and 252 *non-REAL Group* students. After matching, the final sample sized averaged 204 students: 102 *REAL Group* students and 102 *non-REAL Group* students.

Measures

To estimate the efficacy of *REAL Groups*, alcohol use in the past 30 days was assessed. This self-reported measure came from the questionnaire administered in the Spring semester of the students' 8th grade year. Alcohol use is defined as having more than a sip of beer, wine, or liquor in the past 30 days and is dichotomized into (0) no alcohol use and (1) alcohol use.

The self-reported covariates included in the analysis were selected on the basis of students' risk for participating in *REAL Groups*, thus having a higher risk and/or exposure to substance use, and on previous studies indicating the risk factors or substance use in adolescence. All covariates are measured before the implementation of *REAL Groups* and '*keepin it REAL*, in the Fall semester of the students' 7th grade year. The covariates are divided into four groups: (a) demographics, which include gender, age, usual grades in school, Mexican heritage, and single-parent household; (b) substance use exposure, which includes how many of their friends have ever used substances (none [1] to all or most [4]) and how much their parents talk to them about alcohol use (none [1] to extremely much [5]); (c) behavioral risk factors, which includes if they used alcohol (yes or no), cigarettes (yes or no), and marijuana (yes or no) in the past 30 days and negative decision making (infrequent negative decision making [1] to frequent negative decision making [5]); (d) closeness to parent, which is a scaled variable of how much the student agreed that their parent(s) understands them, cares about their feelings, is there when they need them, and lets them know they care (strongly disagree [1] to strongly agree [4]).

Analysis

Because participating students were not selected at random and not without bias (e.g., teachers referred higher risk students), the potential for large differences and biased estimates exist between the *REAL Group* students (e.g., the treatment group) and the classroom-based prevention program only students (e.g., the control group). To account for these differences inherent in a non-random study design, propensity score matching (PSM) is used. PSM is more effective than regression when substantial differences on covariates exist between the treatment group and the control group (Rubin 2001; Koh and Testa 2008). PSM can adjust for these differences because individuals in both the treatment and control groups are matched on their likelihood of group membership (e.g., participating in *REAL Groups*) (Rosnbaum and Rubin 1983; Koh and Testa 2008). This likelihood, or propensity score, is calculated from observed covariates (Rosnbaum and Rubin 1983) and matching participants based on their propensity score simultaneously controls for these covariates and creates balance across groups (Oakes and Johnson 2006; D'Agostino 1998; Koh and Testa 2008). As a result, the non-random biased selection effects are minimized (Guo, et al. 2006), and any differences in the outcome measures are not a result of significant differences in the observed covariates (Frisco et al. 2007) but differences in the treatment.

An analysis using propensity score entails four steps. First, to check for ignorable treatment assignment or conditional independence, *t*-tests and chi-square tests were performed using the treatment variable, participation in *REAL Groups,* on each independent variable, as well as, between the treatment variable and the outcome variable, 30-day alcohol use (Guo and Fraser 2010). Only family structure was significant at $p<.05$. To account for this significance, the average treatment effect for the treated was used to assess the treatment effect (Guo and Fraser 2010). Second, propensity scores are estimated using logistic regression to predict the likelihood that a student would participate in *REAL Groups* using the above-mentioned covariates (Timberlake et al. 2009). Once propensity scores are estimated, common support and balance are checked to ensure that the observed covariates can be observed in both the treatment and control groups and that bias has been significantly reduced (Caliendo and Kopeinig 2005; Frisco et al. 2007). Third, based on the propensity scores, students participating in *REAL Groups* are matched to non-participating students using nearest neighbor without replacement. Once matched, balance is reassessed to ensure that bias remains reduced in the matched sample (Oakes and Johnson 2006). Fourth, the average treatment effect is calculated. In our study, the average treatment effect on the treated (ATT) is the comparison of the proportion of alcohol use among students participating in *REAL Groups* with what the proportion would have been had these same students not participated in *REAL Groups* and simply received the classroom-based prevention program.

Because these data are longitudinal, alcohol use measured in the Spring of students' 8th grade year had a missing data rate of approximately 30%. Although this is not abnormally high for substance use research studies conducted in schools (Aneshensel et al. 1989; Josephson and Rosen 1978), we conducted an attrition analysis using a logistic regression to determine which student covariates predicted attrition by Spring of 8th grade. Attrition was significantly higher among students who came from single-parent households, had a higher number of friends who had ever used substances, and earned lower school grades. In order to account for missing data, we employed multiple imputation (Little and Rubin 2002). Using the PROC MI procedure in SAS 9.1, we created 100 complete datasets, and using Rubin's (1987) method we combined the results of the 100 imputed datasets to calculate the *t*-statistics. In order to account for missing data, using Stata 10, propensity scores were calculated using the pscore procedure, and participants were matched and the average treatment effects were calculated using the psmatch2 command (StataCorp 2009).

Results

Table 1 shows percentages and means for demographic, substance use exposure, behavioral risk factors, and closeness to parent by condition (*REAL Group* participants vs. non-participants) before and after matching. Before matching, compared to non-participants, *REAL Group* participants were significantly older ($t=2.10$, $p<.05$), of Mexican heritage ($t=1.86$, $p<.10$), and came from a two-parent household ($t=2.37$, $p<.05$). In addition, *REAL Group* participants were more likely to have friends who used substances ($t=1.72$, $p<.10$) and were less likely to have parents who discussed alcohol use with them ($t=1.79$, $p<.10$). Although *REAL Group* participants reported more use of alcohol, cigarettes, and marijuana than the non-participants, these were not statistically significant differences. After matching, no significant differences exist between the two groups on demographics, substance use exposure, behavioral risk factors, and closeness to parent by condition indicating balance between the two groups has been achieved (Table 1).

Results of the average treatment effect of the odds of alcohol use are summarized in Table 2. In the non-matched samples ($n=361$), with significant differences existing between covariates, students who participated in the *REAL Groups* and students who participated

only in the classroom-based primary prevention program are significantly different in their odds of using alcohol in the past 30 days (difference=−0.48; t =−1.97), indicating that even compared to students with varying degrees of risk factors for substance use, our higher-risk students who participated in *REAL Groups* have lowered odds of alcohol use by the end of 8th grade. However, when students are properly matched on demographics, substance use exposure, behavioral risk factors, and closeness to parent (n=204), significant differences between the two groups become more dramatic. Compared to the non-participating higher-risk students, the higher-risk students who participated in *REAL Groups* had significantly lower odds alcohol use in the past 30 days (Difference=−0.55; t=−2.32).

Discussion

Although research has shown that some students are at higher risk of using alcohol and other drugs based on their family, peers and demographics (Hayatbakhsh et al. 2008), primary prevention programs are typically designed for all adolescents regardless of their risk for using substances (Gottfredson and Wilson 2003), and in fact, some research has shown that primary prevention programs have a negative or no effect on substance use for higher-risk adolescents (Bell et al. 1993; Ellickson et al. 1993; Wilson et al. 2001). In order to address risk factors and prevent the developments of problems associated with substance abuse, effective secondary prevention programs are needed in addition to primary prevention. While most school-based programs universally address substance use prevention with the goal of delaying the onset of substance use initiation, few provide additional services for students who are already using or at higher risk for substance use. In order to best address the needs of higher-risk adolescents, substance use prevention programs must take into account both the universal needs with a primary prevention program as well as the specific at-risk needs with a secondary prevention (Walker et al. 1996). The results of this study support the hypothesis that providing an additional secondary prevention program for higher-risk students in addition to a primary prevention program reduces alcohol use among middle school-age students when compared to higher-risk students who did not receive the secondary prevention program.

Results indicate that higher-risk 7th grade students who participate in the secondary prevention program, *REAL Groups*, in addition to the primary prevention program, *keepin' it REAL*, have significantly lower odds of using alcohol compared to their matched counterparts who only participated in the primary prevention program. This finding supports previous research which suggests that having a multi-component prevention strategy can be more effective than a single program in reducing substance use, particularly in a higher-risk adolescent population (Johnson et al. 1990). Designing *REAL Groups* as a complement to the primary prevention program effectively addresses the variation in risk factors among students and successfully targets adolescents that appear to be at higher risk for substance use. These findings also suggest that incorporating a culturally adapted mutual aid model is one tool which can be used to reduce substance use among Mexican heritage adolescents. Incorporating aspects of culture in a small group setting may serve as a protective factor against substance use for Mexican heritage adolescents (Gil and Vega 2001; La Roche and Christopher 2009). Although approximately 25% of participants in REAL groups were not of Mexican heritage, these findings suggest that building cultural norms and values and having lessons rooted in these cultural norms of values (Marsiglia and Kulis 2009) can be a source of resilience for Mexican adolescents. While specific cultural aspects of the curriculum were not tested in this paper, future research should build upon these findings to further refine the understandings of how cultural norms and values serve to protect Mexican adolescents from substance use.

Statistically matching students according to risk factors allowed for the creation of a comparison group, addressing selection biases in the original design and strengthened the efficacy size of the *REAL Groups* prevention program. Using propensity score matching allowed for the adjustment of the differences in a non-random design in order for the effectiveness of the prevention program to be ascertained (Rosnbaum and Rubin 1983; Koh and Testa 2008). This study demonstrates that propensity score matching is one viable method that can be used when working with a quasi-experimental design and non-random sampling inherent in many school-based studies. This technique can be useful when evaluating the effects of intervention or prevention studies in which the population that participates in the program is different from those who do not.

Although it is unclear if the observed effect was a function of the design of the secondary prevention, or the effect of an additional program, this study suggests that *REAL Groups* is an efficacious secondary prevention program; however, some limitations should be noted. First, the referral process implemented for the students included in the *REAL Groups*' program may have yielded some inappropriate referrals as classroom teachers were the referring partner, and some teachers may have referred students with discipline problems, rather than those at higher risk for substance use. In addition, it may be possible that students who were better able to conceal their alcohol use might not be referred by the teacher, thus creating differences between the two groups on an unmeasured characteristic. Future research should include a baselines risk assessment for youth and collaborate with the school's on-staff social worker or counselor, because these school staff could have some prior knowledge of student issues and an already established working relationship with referring teachers. Second, the cultural relevancy and intervening mechanisms of *REAL Groups* needs to be further developed, and it could be beneficial to include additional measures to capture participants' feedback and to document the group process more in-depth. Understanding which of the key components of *REAL Groups* were most effective in reducing substance use could create a broader understanding of culturally-grounded secondary prevention programs. For example, future research could examine to what extent participants learned how their cultural norms and values could protect them from substance use and if the participants significantly built a positive social network that modeled prosocial behaviors. Additionally, the small sample size limited the analysis to only include alcohol use by the end of 8th grade. Because *REAL Groups* aims at reducing all types of substance use, particularly alcohol, cigarettes, marijuana, and inhalants, future research should include more students in more schools in order to test if *REAL Groups* also reduces use of cigarettes, marijuana, and inhalants. Finally, due to the quasi-experimental study design, there are inherent limitations that violate the stable unit treatment value assumption (SUTVA). SUTVA assumes no social interaction between treatment groups and that the mechanism through which students were referred would not affect the outcome. Working in schools creates difficulty for not violating SUTVA because one must assume that there is social interaction between participants, and the nature of this study design (i.e., teacher referral for higher-risk youth) may have influenced the outcome in ways that were unobserved and untested in this study. Future research should create a study design in which the treatment groups are separated by schools in order to account for SUTVA or test if regression discontinuity designs (Shadish et al. 2002) could be used as an alternative for treatment assignment based on risk level. However, given these noted limitations, significant differences were still detected between *REAL Groups* students and non-participating matched students.

Conclusions

The statistically significant reduction in reported levels of alcohol use among higher-risk students who participated in *REAL Groups*, in addition to the classroom based *keepin' in*

REAL, compared to higher-risk students who only participated in *keepin' in REAL,* show that addition a secondary prevention program to a primary prevention program increases the overall prevention efficacy. This finding supports the argument that in order to be optimally effective at preventing substance abuse and misuse, school-based programs need to addresses different levels of risk with different levels of prevention. This is not to suggest that primary prevention is not critically important, but only that it may not be as effective for a certain type of higher-risk student. Adding additional programming for these students lowered alcohol use in this sample. Given the number of youth at higher risk for substance use and the limitation of primary classroom prevention for those youth, these findings are critically important in advancing knowledge about small group secondary prevention program strategies. The small group format provided opportunities for integrating the students' culture of origin and their cultural assets into the prevention program. The group facilitators, regardless of their ethnic background, received intensive training on how to help students make those connections to aspects of their cultural heritage that were a source of resiliency and strength against alcohol use and other drugs.

These findings have practice and policy implications as they demonstrate the importance of offering specialized services, such as small group programs to higher-risk students. Such efforts require funding and the availability of trained professional staff to facilitate the groups. Teachers play a critical role in school-based primary prevention efforts, but they cannot be expected to provide secondary prevention. Future research should look at the interdisciplinary and multilevel school-based efforts in order to refine existing prevention models to more effectively address the needs of children of different cultural backgrounds across the continuum of assets and risks.

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References

Aneshensel CS, Becerra RM, Fielder EP, Schuler R. Participation of Mexican American female adolescents in a longitudinal panel survey. Public Opinion Quarterly. 1989; 53:548–562.10.1086/269171

Arrington EG, Wilson MN. A re-examination of risk and resilience during adolescence: Incorporating culture and diversity. Journal of Child and Family Studies. 2000; 9:221–230.10.1023/A:1009423106045

Bangert-Drowns RL. The effects of school-based substance abuse education: A meta- analysis. Journal of Drug Education. 1988; 18:243–264. [PubMed: 3058921]

Barnes GM, Welte JW. Patterns and predictors of alcohol use among 7–12th grade students in New York State. Journal of Studies on Alcohol. 1986; 47:53–62. [PubMed: 3485740]

Barrett EA, Turner RJ. Family structure and substance use problems in adolescence and early adulthood: Examining explanations for the relationship. Addiction. 2006; 101:109–120.10.1111/j.1360-0443.2005.01296.x [PubMed: 16393197]

Bell RM, Ellickson PL, Harrison ER. Do drug prevention effects persist into high school? How project ALERT did with ninth graders. Preventative Medicine. 1993; 22:463–483.

Bernard ME. Emotional resilience in children: Implications for rational-emotive education. Journal of Cognitive and Behavioral Psychotherapies. 2004; 4:39–52.

Bogenschneider K. An ecological risk/protective theory for building prevention programs, policies, and community capacity to support youth. Family Relations. 1996; 45:127–138.

Botvin GJ. Substance abuse prevention: Theory, practice and effectiveness. Crime and Justice: A Review of Research. 1990; 13:461–519.

Botvin GJ, Griffin KW. School-based programs to prevent alcohol, tobacco and other drug use. International Review of Psychiatry. 2007; 19:607–615.10.1080/09540260701797753 [PubMed: 18092239]

Brook JS, Lukoff IF, Whiteman M. Initiation into adolescent marijuana use. The Journal of Genetic Psychology: Research and Theory on Human Development. 1980; 137:133–142.

Brook JS, Brook DW, Gordon AS, Whiteman M, Cohen P. The psychosocial etiology of adolescent drug use: A family interactional approach. Genetic, Social, and General Psychology Monographs. 1990; 116:111–267.

Caliendo, M.; Kopeinig, S. Paper 1588. Institute for the Study of Labor; IZA: 2005. Some practical guidance for the implementation of propensity score matching.

Castro FG, Alarcón EH. Integrating cultural variables into drug abuse prevention and treatment with racial/ethnic minorities. Journal of Drug Issues. 2002; 32:783–810.

Cleveland MJ, Feinberg MF, Bontempo DE, Greenberg MT. The role of risk and protective factors in substance use across adolescence. Journal of Adolescent Health. 2008; 43:157–164. [PubMed: 18639789]

Coatsworth JD, Pantin H, Szapocznik J. Familias Unidas: A family-centered ecodevelopmental intervention to reduce risk for problem behavior among Hispanic adolescents. Clinical Child and Family Psychology Review. 2002; 5:113–132.10.1023/A:1015420503275 [PubMed: 12093012]

D'Agostino RB. Tutorial in biostatistics: Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. Statistics in Medicine. 1998; 17:2265–2281. [PubMed: 9802183]

Eggert LL, Thompson EA, Herting JR, Nicholas LJ. Prevention research program: Reconnecting at-risk youth. Issues in Mental Health Nursing. 1994; 15:107–135. [PubMed: 8169117]

Ellickson PL, Bell RN, McGuigan K. Preventing adolescent drug use: Long-term results of a junior high program. American Journal of Public Health. 1993; 83:856–861.10.2105/AJPH.83.6.856 [PubMed: 8498624]

Ellickson PL, Tucker JS, Klein DJ, McGuigan KA. Prospective risk factors for alcohol misuse in late adolescence. Journal of Studies on Alcohol and Drugs. 2001; 62:773–782.

Escobar JI. Immigration and mental health: Why are immigrants better off? Archives of General Psychiatry. 1998; 55:781–782.10.1001/archpsyc.55.9.781 [PubMed: 9736003]

Farrington, DP.; Gallagher, B.; Morley, L.; Ledger, RJ.; West, DJ. Cambridge study in delinquent development: Long term follow-up (First annual report to the home office, August 31, 1985). Cambridge, England: Cambridge University; 1985.

Frisco ML, Muller C, Frank K. Parents' union dissolution and adolescents' school performance: Comparing methodological approaches. Journal of Marriage and Family. 2007; 69:721–741.10.1111/j.1741-3737.2007.00402.x [PubMed: 20300482]

Fuchs D, Fuchs LS. Introduction to response to intervention: What, why, and how valid is it? Reading Research Quarterly. 2006; 41:93–99.10.1598/RRQ.41.1.4

Gil, AG.; Vega, WA. Latino drug use: Scope, risk factors, and reduction strategies. In: Aguirre-Molina, CWM.; Zambrana, RE., editors. Health issues in the Latino community. San Franscisco, CA: Jossey-Bass; 2001. p. 435-458.

Gil AG, Wagner EF, Vega WA. Acculturation, familism, and alcohol use among Latino adolescent males: Longitudinal relations. Journal of Community Psychology. 2000; 28:443–458.10.10002/1520-6629(200007)28:4<443::AID-JCOP6>3.0CO;2-A

Gitterman, A.; Schulman, L. Mutual aid groups, vulnerable and resilient populations, and the life cycle. New York: Columbia University Press; 2005.

Gosin M, Marsiglia FF, Hecht ML. *keepin' it REAL*: A drug resistance curriculum tailored to the strengths and needs of preadolescents of the southwest. Journal of Drug Education. 2003; 33:119–142.10.2190/DXB9-1V2P-C27J-V69V [PubMed: 12929705]

Gottfredson DC, Wilson DB. Characteristics of effective school-based substance abuse prevention. Prevention Science. 2003; 4:27–38.10.1023/A:1021782710278 [PubMed: 12611417]

Grant BF, Dawson DA. Age of onset of drug use and its association with DSM-IV drug abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. Journal of Substance Abuse. 1998; 10:163–173. [PubMed: 9854701]

Guo S, Fraser MW. Propensity score analysis: Statistical methods and applications. Pyschometrika. 2010; 75:775–777.

Guo S, Barth RP, Gibbons C. Propensity score matching strategies for evaluating substance abuse services for child welfare clients. Children and Youth Services Review. 2006; 28:357–383.

Hair, EC.; Jager, J.; Garrett, SB. Helping teens develop healthy social skills and relationships: What the research shows about navigating adolescents. Washington, DC: Child Trends; 2002.

Hayatbakhsh MR, Mamun AA, Najman JM, O'Callaghan M, Bor W, Alati R. Early childhood predictors of early substance use and substance use disorders: Prospective study. The Australian and New Zealand Journal of Psychiatry. 2008; 42:720–731.10.1080/0004867080220634 [PubMed: 18622780]

Hecht ML, Marsiglia FF, Elek E, Wagstaff DA, Kulis S, Dustman P. Culturally grounded substance use prevention: An evaluation of the *keepin' it REAL* curriculum. Prevention Science. 2003; 4:233–248.10.1023/A:1026016131401 [PubMed: 14598996]

Johnson C, Pentz MA, Weber MD, Dwyer JH, Baer N, MacKinnon DP, et al. Relative effectiveness of comprehensive community programming for drug abuse prevention with high-risk and low-risk adolescents. Journal of Consulting and Clinical Psychology. 1990; 58:447–456.10.1037/0022-006X.58.4.447 [PubMed: 2212182]

Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. NIH publication No 10–7583. Bethesda, MD: National Institute on Drug Abuse; 2010. Monitoring the Future national results on adolescent drug use: Overview of key findings 2009.

Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Monitoring the Future national results on adolescent drug use: Overview of key findings, 2010. Ann Arbor: Institute for Social Research, The University of Michigan; 2011.

Josephson, E.; Rosen, MA. Panel loss in a high school drug study. In: Kandel, D., editor. Longitudinal research on drug use: Empirical findings and methodological issues. Washington, DC: Hemisphere; 1978. p. 115-133.

Kandel DB, Dabies M, Karus D, Yamaguchi K. The consequences in young adulthood and adolescent drug involvement: An overview. Archives of General Psychiatry. 1986; 43:746–754. [PubMed: 3729669]

Koh E, Testa MF. Propensity score matching of children in kinship and nonkinship foster care: Do permanency outcomes still differ? Social Work Research. 2008; 32:105–116.

Kulis S, Marsiglia FF, Nieri T. Perceived ethnic discrimination versus acculturation stress: Influences on substance use among Latino youth in the Southwest. Journal of Health and Social Behavior. 2009; 50:443–459.10.1177/002214650905000405 [PubMed: 20099450]

La Roche MJ, Christopher MS. Changing paradigms from empirically supported treatment to evidence-based practice: A cultural perspective. Professional Psychology: Research and Practice. 2009; 40:396–402.10.1037/a0015240

Lee JAB. Seeing it whole: Social work with groups within an integrative perspective. Social Work with Groups. 1986; 8:39–50.10.1300/J009v08n04_05

Little, RJA.; Rubin, DB. Statistical analysis with missing data. 2. Hoboken NJ: Wiley; 2002.

Lloyd-Richarson E, Papandonatos G, Kazura A, Shanton C, Niaura R. Differentiating stages of smoking intensity among adolescents: Stage-specific psychological and social influences. Journal of Consulting and Clinical Psychology. 2002; 70:998–1009.10.1037/0022-006X.70.4.998 [PubMed: 12182283]

Marklein E, Negriff S, Dorn LD. Pubertal timing, friend smoking and substance use in adolescents girls. Prevention Science. 2009; 10:141–150.10.1007/s11121-008-0120-y [PubMed: 19067163]

Marsiglia, FF.; Kulis, S. Diversity, oppression, and change: Culturally grounded social work. Chicago, IL: Lyceum Books; 2009.

Marsiglia FF, Kulis S, Hecht ML, Sills S. Ethnicity and ethnic identity as predictors of drug norms and drug use among pre-adolescents in the Southwest. Substance Use & Misuse. 2004; 39:1061–1094.10.1081/JA-120038030 [PubMed: 15387204]

Marsiglia FF, Kulis S, Wagstaff DA, Elek E, Dran D. Acculturation status and substance use prevention with Mexican and Mexican American youth. Journal of Social Work Practice in the Addictions. 2005; 5:85–111.10.1300/J160v05n01_05 [PubMed: 21660128]

Marsiglia FF, Peña V, Nieri T, Nagoshi JL. *REAL groups*: The design and immediate effects of a prevention intervention for Latino children. Social Work With Groups. 2010; 33:103–121.10.1080/01609510903366202 [PubMed: 20640232]

Marsiglia FF, Kulis S, Yabiku ST, Nieri TA, Coleman E. When to intervene: Elementary school, middle school or both? Effects of *keepin' it REAL* on substance use trajectories of Mexican heritage youth. Prevention Science. 2011; 12:48–62.10.1007/s11121-010-0189-y [PubMed: 21128119]

Martinez CR. Effects of differential family acculturation on Latino adolescent substance use. Family Relations. 2006; 55:306–317.10.1111/j.1741-3729.2006.00404.x

Masten AS, Coatsworth JD. The development of competence in favorable and unfavorable environments: Lessons from research on successful children. American Psychologist. 1998; 53:205–220.10.1037/0003-066X.53.2.205 [PubMed: 9491748]

Moffit TE. Adolescent-limited and life-course persistent antisocial behavior: A developmental taxonomy. Psychological Review. 1993; 100:674–701.10.1037/0033-295X.100.4.674 [PubMed: 8255953]

Oakes, JM.; Johnson, PJ. Propensity score matching for social epidemiology. In: Oakes, JM.; Kaufman, JS., editors. Methods in social epidemiology. San Francisco, CA: Jossey-Bass; 2006. p. 370-392.

Pantin H, Coatsworth JD, Feaster DJ, Newman FL, Briones E, Prado G, et al. Familias Unidas: The efficacy of an intervention to promote parental investment in Hispanic immigrant families. Prevention Science. 2003; 4:189–201.10.1023/A:1024601906942 [PubMed: 12940469]

Pew Hispanic Center. Hispanics of Mexican origin in the United States, 2008. 2010. Retrieved May 17, 2011, from http://pewhispanic.org/files/factsheets/59.pdf

Phinney JS, Baumann K, Blanton S. Life goals and attributions for expected outcomes among adolescents from five ethnic groups. Hispanic Journal of Behavioral Sciences. 2001; 23:363–377.10.1177/0739986301234002

Phinney JS, Horenczyk G, Liebkind K, Vedder P. Ethnic identity, immigration, and well-being: An interactional perspective. Journal of Social Issues. 2001; 57:493–510.10.1111/0022-4537.00225

Phinney JS, Romero I, Nava M, Huang D. The role of language, parents, and peers in ethnic identity among adolescents in immigrant families. Journal of Youth and Adolescence. 2001; 30:135–153.10.1023/A:1010389607319

Robertson, EB.; David, LS.; Rao, S. Preventing drug use among children and adolescents, A research-based guide for parents, educators, and community leaders. 2. Bethesda, MD: National Institute on Drug Abuse; 2003.

Rosnbaum PR, Rubin DB. The central role of the propensity score in observational studies for causal effects. Biometrika. 1983; 70:41–55.10.1093/biomet/70.1.41

Rubin, DB. Multiple imputation for nonresponse in surveys. New York: Wiley & Sons; 1987.

Rubin DB. Using propensity scores to help design observational studies: Application to the tobacco litigation. Health Services and Outcomes Research Methodology. 2001; 2:169–188.10.1023/A:1020363010465

[SAMHSA] Substance Abuse and Mental Health Services Administration. Science-based prevention programs and principles, 2002. Rockville, MD: U.S. Department of Health and Human Services; 2003.

Santisteban DA, Coatsworth JD, Perez-Vidal A, Mitrani V, Jean-Gilles M, Szapocznik J. Brief structural/strategic family therapy with African and Hispanic high-risk youth. Journal of Community Psychology. 1997; 25:453–471.

Santisteban DA, Perez-Vidal A, Coatsworth JD, Kurtines WM, Schwartz SJ, LaPerriere A, et al. Efficacy of brief strategic family therapy in modifying Hispanic adolescent behavior problems and substance use. Journal of Family Psychology. 2003; 17:121–133.10.1037/0893-3200.17.1.121 [PubMed: 12666468]

Sartor CE, Lynskey MT, Heath AC, Jacob T, True W. The role of childhood risk factors in initiation of alcohol use and progression to alcohol dependence. Addiction. 2007; 102:216–225.10.1111/j.1360-0443.2006.01661.x [PubMed: 17222275]

Schinke SP, Fang L, Cole KCA. Substance use among early adolescent girls: Risk and protective factors. Journal of Adolescent Health. 2008; 43:191–194. [PubMed: 18639794]

Senel T, Kemal Y, Aylin Y, Ozmen M, Milgun B, Pervin E. Psychosocial correlates of substance use among adolescents in Mersin, Turkey. Public Health. 2004; 118:588–593.10.1016/j.puhe.2004.02.009 [PubMed: 15530940]

Shadish, WR.; Cook, TD.; Campbell, DT. Experimental and quasi-experimental designs for generalized causal inference. Boston, MA: Houghton Mifflin; 2002.

Spijkerman R, Van DE, Overbeek G, Engels RCME. The impact of peer and parental norms and behavior on adolescent drinking: The role of drinker prototypes. Psychology & Health. 2007; 22:7–29.10.1080/14768320500537688

Stanton-Salazar, RD. Manufacturing hope and despair: The school and kin support networks of US-Mexican youth. New York: Teachers College Press; 2001.

Stanton-Salazar RD, Spina SU. Informal mentors and role models in the lives of urban Mexican-origin adolescents. Anthropology & Education Quarterly. 2003; 34:231–254.10.1525/aeq.2003.34.3.23

Stanton-Salazar RD, Spina SU. Adolescent peer networks as a context for social and emotional support. Youth & Society. 2005; 36:379–417.10.1177/0044118X04267814

StataCorp. Stata statistical software: Release 10. College Station, TX: StataCorp LP; 2009.

Steinberg L, Morris A. Adolescent development. Annual Review of Psychology. 2001; 52:83–110.0066-4308/01/0201-0083 $14.00.

Stuart RB. Teaching facts about drugs: Pushing or preventing. Journal of Educational Psychology. 1974; 66:189–201.10.1037/h0036275 [PubMed: 4833088]

Timberlake DS, Huh J, Lakon CM. Use of propensity score matching in evaluating smokeless tobacco as a gateway to smoking. Nicotine & Tobacco Research. 2009; 11:455–462. [PubMed: 19307445]

Tobler NS. Meta-analysis of 143 adolescent drug prevention programs: Quantitative outcome results of program participants compared to a control or comparison group. Journal of Drug Issues. 1986; 16:537–567.10.1093/ntr/ntp008

Urberg K, Goldstein MS, Toro PA. Supportive relationships as a moderator of the effects of parent and peer drinking on adolescent drinking. Journal of Research on Adolescence. 2005; 15:1–19.10.1111/j.1532-7795.2005.00084.x

Vega, W.; Gil, A. A model for explaining drug use behavior among Hispanic adolescents. In: De La Rosa, M.; Segal, B.; Lopez, R., editors. Conducting drug abuse research with minority populations: Advances and issues. Binghamton, NY: Haworth Press; 1999. p. 57-74.

Walker, HM.; Shinn, MR. Structuring school-based interventions to achieve integrated primary, secondary, and tertiary prevention goals for safe and effective schools. In: Shinn, MR.; Stonner, HM.; Walker, HG., editors. Interventions for academic and behavior problems II: Preventive and remedial approaches. Bethesda, MD: NASP Publications; 2002. p. 1-26.

Walker HM, Horner RH, Sugai G, Bullis M, Sprague JR, Bricker D, et al. Integrated approaches to preventing antisocial behavior patterns among school-age children and youth. Journal of Emotional and Behavioral Disorders. 1996; 4:194–209.10.1177/106342669600400401

Wills, TA.; Mariani, J.; Filer, M. The role of family and peer relationships in adolescent substance use. In: Pierce, GR.; Sarason, BR.; Sarason, IG., editors. Handbook of social support and the family. New York: Plenum; 1996. p. 521-549.

Wilson DB, Gottfredson DC, Najaka SS. School-based prevention of problem behaviors: A meta-analysis. Journal of Quantitative Criminology. 2001; 17:247–272.10.1023/A:1011050217296

Zamboanga BL, Schwartz SJ, Ham LS, Jarvis LH, Olthuis JV. Do alcohol expectancy outcomes and valuations mediate peer influences and lifetime alcohol use among early adolescents? The Journal of Genetic Psychology. 2009; 170:359–376.10.1080/00221320903218380 [PubMed: 20034190]

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Table 1

Characteristics of *REAL Group* participants and non-participants before and after matching on propensity score

	Scale or range	Non-matched sample (*n*=361)			Matched sample (*n*=204)		
		REAL Group participants % or mean	Non-Participants % or mean	*t*-test[a]	*REAL Group* participants % or mean	Non-participants % or mean	*t*-test[a]
Demographics							
Age	11–14	12.34	12.22	2.10*	12.33	12.36	−0.37
Female gender	y/n	52.29%	56.75%	−0.78	53.92%	51.96%	0.28
Usual grades in school	1–9	6.56	6.4	0.88	6.64	6.72	−0.43
Mexican heritage	y/n	74.31%	64.29%	1.86+	72.55%	74.51%	−0.32
Two-parent household	y/n	71.56%	58.33%	2.37*	72.55%	80.39%	−1.32
Substance use exposures							
Friends, use of substances	1–4	1.96	1.74	1.72+	1.93	1.97	−0.24
Parent talks about alcohol use	1–5	3.12	3.39	−1.79+	3.12	2.96	−0.79
How easy to get substances	1–4	2.05	2.14	−0.65	2.02	1.89	0.78
Behavioral risks							
Use of alcohol	y/n	30.19%	26.94%	0.64	29.41%	29.41%	0.00
Use of cigarettes	y/n	9.17%	5.91%	1.10	7.84%	8.82%	0.25
Use of marijuana	y/n	9.17%	7.11%	0.66	6.86%	8.82%	0.52
Negative decision making	1–5	1.89	2.02	−1.38	1.86	1.81	0.47
Closeness to parent							
Parental closeness	1–4	3.34	3.26	0.64	3.34	3.34	0.06

[a] *t*-tests were calcuated in Stata using the mim: regress or the mim: logistic command

* $p < .05$,

+ $p < .10$

Table 2

Average treatment effect of the treated the odds of alcohol use controlling for propensity score in matched samples

		***REAL Group* participants Odds**	**Non-participants Odds**	**Difference**	***t*-statistic**	**Number of students**
Alcohol use	Non-Matched	0.63	1.11	−0.48	−1.97*	*n*=361
	Matched	0.63	1.18	−0.55	−2.32**	*n*=204

** $p<.01$,

* $p<0.05$