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The Normative Environment for Drug Use: Comparisons among American Indian and White Adolescents

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Abstract

The present study examined the influence of descriptive norms, injunctive norms, perceived outcome expectancies, and ethnicity on marijuana and inhalant use among 2334 American Indian and white high school students who lived on or near reservations in the United States. Hierarchical multiple regression analyses were conducted with survey data collected during the 2009-2010 and 2010-2011 school years. Results suggest differences between ethnicities in the influence of the normative environment and outcome expectancies on both marijuana and inhalant use. Study limitations are noted, and future research is suggested.

Substance use among adolescents is a major public health concern. Adolescents in general are at increased risk for substance use and related-problems (Winters & Lee, 2008), and American Indian (AI) youth represent one specific group of adolescents at an even higher elevated risk. In particular, AI adolescents report higher rates of marijuana use than their non-AI peers (Beauvais, 1992; Hawkins, Cummins, Martlatt, 2004; Wallace et al., 2003), and frequent marijuana use among AI adolescents has been linked to the use of other illicit drugs (Novins & Mitchell, 1998). In addition, these youth initiate drug use earlier (Beauvais, 1992), and AI substance abuse has been implicated in the disproportionately high rates of morbidity and mortality in this population (Indian Health Service, 2009). Despite prevention efforts, substance use and related problems continue to be a substantial problem in AI communities. While AI adolescents are at a heightened risk, this population is underrepresented in the literature, and research specific to AI youth is strongly indicated given their heightened levels of risk (see Hawkins et al., 2004 for a review). Therefore, it is important to determine the contributing factors for substance use among this population as well as comparing these factors among other groups of youth.

Environmental Influences

Environmental influences may be a major contributing factor for AI substance use. In particular, social norms are likely to influence individual adolescent behavior, and norms for behavior can be transmitted between individuals through environmental influences such as community and culture. According to primary socialization theory (Oetting & Donnermeyer, 1998), adolescents learn norms and behaviors through interactions with primary socialization sources (i.e., family, school, and peer groups). From this perspective, substance use among youth can reflect a socialization process in which the norms and expectancies of the socialization sources are adopted. Moreover, social learning theory (Bandura, 1986), and social norms theory (Fishbein & Azjen, 1975) posit that the attitudes, beliefs, and behaviors of a social group are potent influencers of individual behavior, and individuals are likely to adopt behaviors of their social group. In this sense, behaviors of other individuals in the environment impact an individual's own behavior, including substance use.

Specific to the AI community, environmental influences may be particularly important for the development and maintenance of substance use behaviors. AI adults have higher rates of

alcohol use disorders and report higher rates of illicit drug use, including marijuana and inhalant use, than all other ethnic groups (Office of Applied Studies, 2007). Furthermore, reservation-based AI youth report higher rates of marijuana and inhalant use than youth in nationwide samples (Beauvais, 1992; Swaim, Stanley, & Beauvais, in press). Thus, the normative environment for AI adolescents is likely to be more supportive of substance use due to the high rates of use among both the adolescents' peers and adults. The overall high rates of substance use in AI reservation-based communities may place youth in these locations at higher risk regarding their attitudes, beliefs, and behaviors surrounding use of illicit substances.

Prevention interventions utilizing an approach to correct exaggerated beliefs regarding the normative environment have been implemented with AI youth. In one example, Moran and Reaman (2002) found that such an approach targeting misperceptions of alcohol use was effective in reducing alcohol use among urban AI youth. In addition, recent research indicated that AI youth both perceive stronger norms for alcohol use and report more alcohol use than their non-AI peers (Dieterich, Swaim, & Beauvais, under review), further suggesting the influence of the normative environment for this population. These processes are also likely to be influential among majority youth; past study suggests that efforts targeting social norms can be effective for correcting exaggerated perceptions of substance use among college students (Borsari & Carey, 2000; Dejong et al., 2006) and adolescents (Beck & Treiman, 1996; Callus, Flynn, & Worder, 2004; Elek, Miller-Day, & Hecht, 2006). The present study examined the influence of the normative environment among two groups of adolescents (AI and white), populations at heightened risk for substance use, exploring potential ethnicity differences in the normative processes active for marijuana and inhalant use.

Theory of Normative Social Behavior

The mechanism by which the normative environment affects adolescent substance use may operate on an individual level. According to the theory of normative social behavior (TNSB; Rimel & Real, 2005), the effect of descriptive norms on individual behavior varies as a function of three cognitive mechanisms: perceived injunctive norms, perceived outcome expectancies, and perceived group similarity. Descriptive norms reflect perceptions of the prevalence of a behavior among peers (e.g., what other adolescents are doing), while injunctive norms reflect perceptions of approval or disapproval of a behavior by other people (i.e., what others think of a behavior) (Cialdini, Reno, & Kallgreen, 1990). While these types of norms can be congruent, they may also differ depending on the individual's referent group. For instance, an adolescent may believe that most members of their peer group use marijuana (descriptive norm); however, most adults in their social network would not approve of such behavior (injunctive norm). Further, previous research indicates that descriptive norms and injunctive norms independently affect behavior (Borsari & Carey, 2003; Larimer, Turner, Mallett, & Geisner, 2004; Lee et al., 2007), indicating that these two norms types are distinct and should be studied independently.

In addition, outcome expectancies reflect the extent to which an individual believes that an action will lead to a certain outcome, and these expectancies can influence behavior (Bandura, 1977, 1986). If an individual perceives a behavior (e.g., substance use) to be beneficial, then the individual is more likely to engage in that behavior. According to the TNSB, outcome expectancies can reflect perceptions of benefits of the behavior for the self or for other people, as well as anticipatory socialization stemming from the behavior (e.g., substance use as a social lubricant). Prior studies show that outcome expectancies are influential in substance use, including alcohol use (Jones, Corbin, & Fromme, 2001) as well as marijuana use (Boys et al., 1999; Neighbors, Geisner, & Lee, 2008). Finally, perceived

group similarity reflects the extent to which an individual perceives others in their social group to be similar to themselves, and norms from a group perceived as similar have been shown to be more influential than norms from a group perceived as less similar (Campo et al., 2003).

Both descriptive norms and the mechanisms proposed by TNSB (i.e., injunctive norms, outcome expectancies, and group similarity) may have direct effects on individual behavior. The three mechanisms may also amplify the effect of descriptive norms on individual behavior. Rimal (2008) found that all three normative mechanisms interacted with descriptive norms to influence behavioral intentions to use alcohol, suggesting the importance of including these mechanisms in an examination of normative influence. From a TNSB framework, adolescent substance use may be influenced by perceived substance use prevalence among peers as well as the moderating mechanisms of injunctive norms, expectancies of outcomes from substance use, and similarity of the referent group. While all three normative mechanisms have been shown to be influential, the moderating roles of injunctive norms and outcome expectancies are examined in present study.

Specific to AI adolescents, evidence suggests that descriptive norms, injunctive norms, and outcome expectancies have important implications for substance use. Past study has found that AI youth were more likely than other ethnic groups to believe that all or most of their peers get drunk at least once a week (descriptive norms; Office of Applied Studies, 2004). In comparison to non-AI youth, AI youth also reported stronger descriptive norms for alcohol use (Dieterich, Swaim, & Beauvais, under review). Additionally, injunctive norms may also be critical for AI youth considering the high prevalence rates of adult substance use, which may influence community norms and approval. In fact, compared with other ethnic groups, AI youth reported less perceived parental disapproval of substance use (Office of Applied Studies, 2004). Furthermore, outcome expectancies may also play a role; AI youth perceive less risk associated with substance use than their non-AI peers (Office of Applied Studies, 2004). In majority adolescents, positive outcome expectancies have been shown to be associated with increased marijuana use (Boys et al., 1999; Neighbors, Geisner, & Lee, 2008) as well as higher alcohol use (Jones, Corbin, & Fromme, 2001).

We demonstrated in an earlier study that outcome expectancies moderated the effects of descriptive norms on alcohol use among both AI and white youth who attended schools on or near AI reservations (Dieterich, Swaim, & Beauvais, under review). This was consistent with findings for white youth reported by Rimal, Lapinski, Cook, and Real (2005). We extend our past work in the current study to marijuana and inhalant use. We first examine the role of descriptive norms on these behaviors, and then consider the moderating role of injunctive norms and outcome expectancies for each substance as a function of ethnicity. It is hypothesized that both injunctive norms and outcome expectancies will moderate these relationships. Further, the influence of injunctive norms and outcome expectancies are hypothesized to be stronger for AI adolescents.

Methods

Participants

The present study is part of a larger ongoing epidemiological study of AI adolescent substance use. AI and white youth were recruited from schools on or near reservations with at least 20% AI youth enrolled. Recruitment is based on a sampling scheme to approximate the percentage of American Indians residing in seven geographic regions (Northwest, Northern Plains, Northeast, Southeast, Southern Great Plains, and Southwest). Each school received \$500 for participation and was given a comprehensive report of survey findings as incentives for participation.

For the school years 2009-2010 and 2010-2011, fifteen schools were surveyed in Washington, Oregon, Montana, Arizona, South Dakota, Minnesota, and Nevada. Ten of the schools were public schools, and five were Bureau of Indian Education schools. Specific identity of tribes and reservations are kept confidential, and general geographic information is provided to describe the sample. Ninth through twelfth grade students who self-identified as AI ($n = 984$) or white ($n = 1350$) are included in this analysis. 48% of the sample was male, 48% was female, and 4% did not indicate a gender. The mean age for students was 16.04 years ($SD = 1.24$).

Procedure

All survey procedures were approved by the Colorado State University IRB. In addition, a resolution of support was obtained from the appropriate tribal authority before proceeding with an agreement to survey. At each school, a teacher or school staff member completed online and telephone IRB training prior to administering surveys. This school staff member was responsible for supervising all survey administration procedures and providing notification of any discrepancies in procedures. Parents were notified of survey administration at school by both a notification letter sent home with the student as well with a broad media release. Passive consent was obtained, and parents could elect to remove their child from survey administration by either returning a signed notification to withdrawal form or verbally requesting withdrawal to the school principal. Less than one percent of students were withdrawn from survey administration due to lack of parental consent.

On the day of survey administration, school staff read a brief set of instructions to the students, including telling students that participation was voluntary and that any question could be left blank if they did not wish to answer it. A class period was allotted for the students to complete the survey. No identifying information was collected, and survey administration procedures for giving and collecting surveys were used to ensure complete anonymity and confidentiality. Student who were not participating in the survey administration were moved to an area separate from survey administration. Once a participating student completed the survey, the student randomly placed the completed survey in a large envelope which was sealed once all students handed in their surveys. The surveys were then returned to the researchers for optical scanning.

Measures

Participants were administered The American Drug and Alcohol Survey™, which has been refined for use with AI youth. This survey has been also validated for use with majority and other ethnic minority groups (Oetting & Beauvais, 1990).

Descriptive norms—Descriptive norms for each substance were measured with a two-item scale ($\alpha = .83$ for marijuana, $\alpha = .78$ for inhalants). Participants were asked to indicate their agreement with the following statements: “Think about your classmates, how often do you think the average student... (uses marijuana in a month, sniffs inhalants in a month)” (rated on a scale ranging from 1=none to 5=10 or more times), and “How many of your classmates... (use marijuana at least once a month, sniff inhalants at least once a month)” (rated on a scale ranging from 1=none to 5=almost all). Individual item responses were standardized and descriptive norms scale scores were computed by taking the mean of the items. Higher scores reflect stronger perceived descriptive norms for use.

Injunctive norms—Peer injunctive norms were measured with a single item for each substance. Participants were asked to indicate their agreement with the statements: “Most students think it is wrong for other students to... (use marijuana, sniff inhalants).” Adult injunctive norms were measured with similar items: “Most adults think it is wrong for

student to... (use marijuana, sniff inhalants).” The questions were rated on a 5-point scale ranging from strongly agree to strongly disagree. These items were reverse coded, individual item responses were standardized, and injunctive norms scale scores (peer and adult) were computed by taking the mean of the items. Higher scores reflect stronger perceived injunctive norms (i.e., disapproval) for substance use.

Outcome expectancies—Outcome expectancies were measured with ten-item scales for each substance ($\alpha = .93$ for marijuana, $\alpha = .92$ for inhalants). These scales measured perceived benefits to self (e.g., “Using marijuana makes me feel good”), perceived benefits to others (e.g., “For most others, sniffing inhalants is fun”), and anticipatory socialization (e.g., “Using marijuana is an important part of being with friends”). Participants were asked to indicate their agreement on a 5-point scale ranging from 1 = strongly agree to 5 = strongly disagree. These items were reverse coded, individual item responses were standardized, and outcome expectancies scale scores were computed by taking the mean of the items. Higher scores reflect higher levels of positive outcome expectancies.

Substance use—Marijuana use was measured by three items ($\alpha = .94$) including “How often in the last 12 months have you used marijuana” (rated on a scale ranging from 1=none to 6= 50 or more times), “How often in the last month have you used marijuana” (rated on a scale ranging from 1=none to 6=several times a day), and “In using marijuana are you a” (rated on a scale ranging from 1= non user to 6= very heavy user). Inhalant use was measured with two items ($\alpha = .80$) including “How often in the last 12 months have you ‘sniffed’ or ‘huffed’ ” (rated on a scale ranging from 1=none to 6= 50 or more times), and “How often in the last month have you ‘sniffed’ or ‘huffed’ ” (rated on a scale ranging from 1=none to 6=20 or more times). For marijuana and inhalants separately, use scale scores were computed by summing the individual item responses. Higher scores on substance use scales reflect higher levels of substance use.

Results

A series of hierarchical regression analyses were conducted to assess whether ethnicity moderated the relationships between descriptive norms and the three proposed normative mechanisms (peer injunctive norms, adult injunctive norms, outcome expectancies) on substance use. Separate analyses were conducted for marijuana and inhalant use. Substance use scale scores were specified as the outcome variable. Ethnicity and gender were dummy coded (AI= 1, female=1), age was mean centered, and a set of dummy codes to adjust for school membership was entered into the model. All other predictors were standardized. Zero-order correlations are presented in Table 1 by ethnicity for descriptive purposes.

Control variables were entered at step I (gender, age, ethnicity). Main effects were entered at step II (descriptive norms, adult injunctive norms, peer injunctive norms, outcome expectancies), two-way interaction effects (descriptive norms $\times$ normative mechanism) were evaluated in step III, and three-way interactions (ethnicity $\times$ descriptive norms $\times$ normative mechanism) to evaluate ethnicity as a moderator of interactions between descriptive norms and normative mechanisms were entered in step IV. Where significant interactions were found, follow-up probes of interactions, testing simple slopes at various levels of predictors, were conducted as described by Aitken and West (1991). Parameter estimates are presented in Table 2 and 3.

Preliminary Analyses

Results revealed that, on average, AI adolescents reported higher levels of substance use than their white peers. AI adolescents’ reported marijuana use sum scores ($M = 7.91$, $SD =$

5.31) were significantly higher than white student's reported marijuana use sum scores ($M = 4.62$, $SD = 3.48$), $t(2393) = -17.94$, $p < .001$. In addition, inhalant use sum scores were higher among AI adolescents ($M = 2.31$, $SD = 1.04$) than compared to white students ($M = 2.12$, $SD = .68$), $t(2282) = -5.22$, $p < .001$.

Marijuana Results

Outcome expectancies—The results reveal that outcome expectancies significantly moderated the relationship between descriptive norms and marijuana use ($b = 1.16$, $t(2091) = 11.73$, $p < .001$). For both white and AI youth with average and above average perceived positive outcome expectancies, marijuana use increased as descriptive norms increased. Below average levels of outcome expectancies among both white and AI youth buffered the effect of higher levels of descriptive norms on marijuana use; use decreased for these youth with low levels of perceived positive outcome expectancies. Ethnicity was not found to be a significant moderator of the relationship between descriptive norms and outcome expectancies on marijuana use ($b = -.13$, $t(2091) = -1.53$, $p = .125$).

Peer injunctive norms—A significant interaction was found between peer injunctive norms and descriptive norms on marijuana use ($b = -.46$, $t(2106) = 5.22$, $p < .001$). For both AI and white adolescents, the effect of descriptive norms on marijuana use was stronger for youth with below average peer injunctive norms, and this effect was weaker for youth with above average peer injunctive norms. In other words, peer injunctive norms buffered the negative effect of descriptive norms on marijuana use. Additionally, ethnicity was not found to be a significant moderator of the relationship between descriptive norms and peer injunctive norms on marijuana use ($b = .03$, $t(2106) = .39$, $p = .699$).

Adult injunctive norms—Adult injunctive norms were found to significantly moderate the relationship between descriptive norms and marijuana use ($b = -.37$, $t(2110) = -4.59$, $p < .001$). For both AI and white adolescents, the effect of descriptive norms on marijuana use was stronger for youth with below average adult injunctive norms, and this effect was weaker for youth with above average adult injunctive norms. Adult injunctive norms buffered the negative effect of descriptive norms on marijuana use. In addition, ethnicity was found to moderate the relationship between descriptive norms and adult injunctive norms on marijuana use when controlling for age, gender, and school membership ($b = -.08$, $t(2110) = -2.41$, $p = .016$) (see Figure 1). For AI youth with average and below average adult injunctive norms, the effect of descriptive norms on marijuana was stronger than for white youth.

Inhalants

Outcome expectancies—Outcome expectancies significantly moderated the relationship between descriptive norms and inhalant use ($b = .29$, $t(2053) = 15.35$, $p < .001$). For both white and AI youth with average and above average outcome expectancies, inhalant use increased as descriptive norms increased, particularly for the highest levels of perceived positive outcome expectancies (see Figure 2). In addition, below average levels of levels of perceived positive outcome expectancies among both AI and white youth served to protect against increased in inhalant use as a function of higher levels of descriptive norms. Ethnicity moderated the relationship between descriptive norms and outcome expectancies for inhalant use when controlling for age, gender, and school membership ($b = .03$, $t(2053) = 8.27$, $p < .001$). At low levels of descriptive norms, the effect of perceived positive outcome expectancies on inhalant use was stronger for white adolescents. Alternatively, this effect was stronger for AI youth at high levels of descriptive norms.

Peer injunctive norms—The effect of descriptive norms did not differ as a function of peer injunctive norms for both AI and white adolescents ($b = -.02$, $t(2077) = -1.32$, $p = .19$); however, ethnicity did significantly moderate the relationship between descriptive norms and peer injunctive norms on inhalant use when controlling for age, gender, and school membership ($b = -.02$, $t(2077) = 2.82$, $p = .005$) (see Figure 3). At low levels of descriptive norms, the effect of peer injunctive norms on inhalant use was stronger for white adolescents; however, this effect was stronger for AI adolescents at higher levels of descriptive norms.

Adult injunctive norms—The effect of adult injunctive norms on the relationship between descriptive norms and inhalant use was marginally significant ($b = -.03$, $t(2076) = -1.94$, $p = .053$), with the effect of descriptive norms on inhalant use trending towards being stronger for youth with below average levels of adult injunctive norms. Ethnicity was not found to moderate the relationship between descriptive norms and adult injunctive norms on inhalant use.

Discussion

The present study advances the literature regarding the normative factors for adolescent substance use as well as comparing these factors across two groups of ethnically different adolescents who attend the same schools. Given the elevated risk for substance use among AI adolescents compared to adolescents belonging to other ethnic groups (Office of Applied Studies, 2007), investigations into the contributing factors for substance use in this population are essential. Previous research indicates that normative influences can influence substance use behaviors (Beck & Treiman, 1996; Callus, Flynn, & Worden, 2004; Elek, Miller-Day, & Hecht, 2006). Consistent with past findings and predicted by our hypotheses, outcome expectancies moderated the relationship between descriptive norms and substance use (both marijuana and inhalant use) among both white and AI adolescents, with the negative effects of strong descriptive norms amplified among adolescents with strong perceived positive outcome expectancies. In comparisons between AI and non-AI adolescents, ethnicity was found to play an important role in this relationship. For inhalant use only, perceived positive outcome expectancies had a stronger effect for white adolescents at low levels of descriptive norms. Alternatively, this effect was stronger for AI adolescents at high levels of descriptive norms. These findings suggest that this mechanism operates differently for AI and white youth inhalant use. When perceptions of peer use are low, white adolescent's perceptions of potential benefits for use are stronger influences compared to AI youth. The opposite is true for environments when perceptions of peer use are high: AI's outcome expectancies are stronger influences compared to white youth. This is particularly important considering the high rates of AI inhalant use; normative mechanisms are stronger correlates of inhalant use in the presence of these high rates of use for AI youth. In this sense, positive outcome expectancies put AI youth at a heightened risk for use, especially in an environment with high rates of inhalant use.

In terms of injunctive norms, the deleterious effects of strong descriptive norms for marijuana use were stronger for AI youth who reported low adult injunctive norms (i.e., lack of disapproval). This finding suggests that adult disapproval of marijuana among AI adolescents is of particular importance among these adolescents. Given that AI adolescents report lower parental disapproval of substance use compared to other ethnic groups and the high rates of substance use, risk for marijuana use is increased two-fold for AI youth. While perceiving high rates of peer use, these youth lack the buffering influence of parental or adult disapproval for use, which places them at a heightened risk for marijuana use. For inhalant use, this relationship did not differ between AI and white youth. This may represent more of a cultural acceptance of marijuana use among AI adults and parents. It may be the

case that inhalant use is generally disapproved by adults in the community, by both AI and white adults and parents, which would contribute to the lack of influence of ethnicity in these relationships.

Finally, ethnicity was influential on the relationship between peer injunctive norms and descriptive norms for inhalant use, but this was not found to be the case for marijuana use. In the presence of strong descriptive norms for inhalant use, the effect of weak peer injunctive norms (i.e., lack of disapproval) is stronger for AI youth. On the other hand, this effect is stronger among white youth at low levels of descriptive norms. For AI youth, perceived peer disapproval of inhalant use appears to be of particular significance, as this disapproval can buffer the negative effects of strong descriptive norms for use. In sum, these results confirm prior research on the moderating effects of normative mechanisms; however, these mechanisms appear to operate differently across substances as well as across ethnicities.

Limitations

As with any study, it is important to recognize limitations. AI adolescents were sampled from eight states in this sample, and regional variations in substance use should be taken into consideration (Plunkett & Mitchell, 2000). As the adolescents in this sample were living on or near reservations, generalizability to other groups (e.g., urban) is limited. The mechanisms of interest in the present study may operate differently in other groups of AI adolescents. On the other hand, Spicer et al. (2003) found that AI regional group membership accounted for only a small amount of the variance in substance use, indicating the results of the present study may be generalizable to AI and white adolescents living on or near reservations, but not urban adolescents.

Another limitation of this study is the cross-sectional nature of the sample, which limits casual attributions. For instance, it is unknown whether the normative environment (i.e., descriptive norms, injunctive norms) and individual perceptions (i.e., outcome expectancies) cause behavior change, or if engaging in a behavior leads to changes in the perceptions of the normative environment and outcome expectancies. On the other hand, past research findings indicate the effectiveness of norms-based interventions to reduce substance use (Dejong et al., 2006; Turner, Perkins, & Bauerle, 2008) suggesting the impact of the normative factors on behavior. These factors should be examined longitudinally in future research. Also, self-report questionnaires were used in the present study to assess a sensitive topic, illegal substance use. In order to foster accurate responding, surveys were anonymous to increase honest responding.

Implications

The findings from the present study demonstrate the influence of descriptive norms, injunctive norms, outcome expectancies, and ethnicity for adolescent marijuana and inhalant use. In particular, this study highlighted the deleterious effects of positive outcome expectancies for use, low perceived peer and adult disapproval of use, and strong descriptive norms for use. For marijuana use, the combination of strong descriptive norms with low perceived adult injunctive norms was associated with higher rates of marijuana use among AI youth. Additionally, AI inhalant use was higher when strong descriptive norms for use were paired with either low peer injunctive norms or high positive outcome expectancies. These findings are of critical importance because it suggests that these processes operate differently among AI and white youth. Prevention and intervention efforts may need to be tailored to different ethnic groups while also taking into account that these mechanisms may operate differently by substance.

Social norms-based approaches to substance use prevention and intervention have yielded mixed results, with some research suggesting the effectiveness of these campaigns with majority adolescents to influence perceptions of normative peer substance use (Beck & Treiman, 1996; Callus, Flynn, & Worder, 2004; Elek, Miller-Day, & Hecht, 2006), and other research citing a failure to achieve actual behavior change (Clapp, Lange, Russell, Shillington, & Voas., 2003; Weschler et al., 2003). In light of the present study, the effectiveness of norms-based approaches may be improved by campaign tailoring to different ethnic groups of adolescents. In addition, descriptive norms for use should continue to be a focus of these campaigns; peer injunctive norms, adult injunctive norms, and outcome expectancies could be additional targets to reduce adolescent substance, among both AI and white youth.

The present study's findings highlight the harmful effects of strong descriptive norms, weak peer and adult injunctive norms, and strong positive outcome expectancies for marijuana and inhalant use. These normative processes were compared among white and AI adolescents, a population particularly at a risk for substance use. For AI adolescents, these normative influences can operate together in processes that increase the AI adolescent's use of substances above and beyond the processes observed in white adolescents. In sum, the normative processes may be potential points of intervention to ultimately reduce adolescent substance use, especially among AI adolescents.

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Figure 1.
Estimated marijuana use sum scores as a function of descriptive norms and adult injunctive norms.

Figure 2.
Estimated inhalant use sum scores as a function of descriptive norms and outcome expectancies.

Figure 3. Estimated inhalant use sum scores as a function of descriptive norms and student injunctive norms.

Table 1
Zero-Order Correlations among Variables for Marijuana and Inhalant Use

	1	2	3	4	5
For Marijuana Use					
1. Descriptive Norms	---	.43**	-.44**	-.14**	.32**
2. Outcome Expectancies	.46*	---	-.44**	-.21**	.59**
3. Student Injunctive Norms	-.40**	-.39**	---	.39**	-.37**
4. Adult Injunctive Norms	-.18**	-.21**	.37**	---	-.28**
5. Marijuana Use	.40**	.63**	-.36**	-.30**	---
For Inhalant Use					
1. Descriptive Norms	---	.21**	-.26**	-.10**	.11**
2. Outcome Expectancies	.25**	---	-.27**	-.17**	.29**
3. Student Injunctive Norms	-.16**	-.15**	---	.40**	-.11**
4. Adult Injunctive Norms	-.04	-.09*	.44**	---	-.14**
5. Inhalant Use	.28**	.36**	-.10*	-.02	---

Note. Correlations for white adolescent are above the diagonal. Correlations for AI adolescents are below the diagonal.

* $p < .05$.

** $p < .001$.

Table 2
Hierarchical Prediction of Marijuana Use Scores

Variable	β	R^2	ΔR^2
Step I. Controls			
Gender	-.40 *		
Age	.32 **		
Ethnicity	3.15 **		
Overall Statistics		.12	.12
Step II. Main effects			
IIA. Descriptive Norms	.40 **		
IIA. Outcome Expectancies (OE)	3.12 **	.46	.34 **
IIB. Descriptive Norms	1.17 **		
IIB. Student Injunctive Norms	-1.05 **	.30	.17 **
IIC. Descriptive Norms	1.43 **		
IIC. Adult Injunctive Norms	-.98 **	.30	.18 **
Step III. Two-way interactions			
IIIA. Descriptive Norms $\times$ OE	1.16 **	.49	.03 **
IIIB. Descriptive Norms $\times$ Student Injunctive Norms	-.46 **	.31	.01 **
IIIC. Descriptive Norms $\times$ Adult Injunctive Norms	-.37 **	.31	.01 **
Step IV. Three-way interactions			
IVA. Descriptive norms $\times$ OE $\times$ ethnicity	-.13	.49	.01 **
IVB. Descriptive norms $\times$ Student Injunctive Norms $\times$ Ethnicity	.03	.31	.00
IVC. Descriptive norms $\times$ Adult Injunctive Norms $\times$ Ethnicity	-.08 *	.31	.002 *

Note. Separate models were run for each of the normative mechanism. A= model including outcome expectancies, B= model including student injunctive norms, C= model including adult injunctive norms. Parameter estimates are provided for each predictor at the step which they were first entered. Models also included dummy coded school variables to control for nesting within schools.

*
 $p < .05$

**
 $p < .001$.

Table 3
Hierarchical Prediction of Inhalant Use Scores

Variable	β	R^2	ΔR^2
Step I. Controls			
Gender	.02		
Age	-.04 [*]		
Ethnicity	.15 ^{**}		
Overall Statistics		.01	.01
Step II. Main effects			
IIA. Descriptive Norms	.12 ^{**}		
IIA. Outcome Expectancies (OE)	.31 ^{**}	.14	.13 ^{**}
IIB. Descriptive Norms	.17 ^{**}		
IIB. Student Injunctive Norms	-.05 [*]	.07	.05 ^{**}
IIC. Descriptive Norms	.18 ^{**}		
IIC. Adult Injunctive Norms	-.04 [*]	.07	.05 ^{**}
Step III. Two-way interactions			
IIIA. Descriptive Norms $\times$ OE	.29 ^{**}	.23	.09 ^{**}
IIIB. Descriptive Norms $\times$ Student Injunctive Norms	-.02	.07	.001
IIIC. Descriptive Norms $\times$ Adult Injunctive Norms	-.03	.07	.002
Step IV. Three-way interactions			
IVA. Descriptive norms $\times$ OE $\times$ ethnicity	.03 ^{**}	.51	.03 ^{**}
IVB. Descriptive norms $\times$ Student Injunctive Norms $\times$ Ethnicity	.02 [*]	.08	.01 ^{**}
IVC. Descriptive norms $\times$ Adult Injunctive Norms $\times$ Ethnicity	.00	.07	.01 ^{**}

Note. Separate models were run for each of the normative mechanism. A= model including outcome expectancies, B= model including student injunctive norms, C= model including adult injunctive norms. Parameter estimates are provided for each predictor at the step which they were first entered. Models also included dummy coded school variables to control for nesting within schools.

*
 $p < .05$

**
 $p < .001$