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Outcome Expectancies, Descriptive Norms, and Alcohol Use: American Indian and White Adolescents

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Abstract

This study examined the relationships between adolescent alcohol use and outcome expectancies and descriptive norms for a sample of American Indian and white youth living on or near reservations. Three outcome expectancies proposed by the theory of normative social behavior (perceived benefits to self, perceived benefits to others, and anticipatory socialization) were examined. Survey data were collected from high school students in the 2009–2010, 2010–2011, and 2011–2012 school years. Stronger descriptive norms for use and higher perceived benefits to self from use were associated with alcohol use in the last month, drunkenness in the last month, and binge drinking. Perceived benefits to self also moderated the relationship between descriptive norms and both alcohol use in the last month and binge drinking, and the effect of descriptive norms on use became more robust as perceived benefits to self increased. Outcome expectancies of perceived benefits to others and anticipatory socialization did not moderate the relationship between norms and alcohol use. Implications for prevention are discussed.

Keywords

Descriptive norms; Outcome expectancies; Alcohol; Adolescents

Introduction

In recent years, there has been considerable interest in the influence of social norms on substance use behaviors, particularly among adolescents and young adults. A social norms approach to substance use prevention has been employed to change normative beliefs regarding substance use with the goal of reducing individual use. Some research has suggested that norms-based interventions can influence students' exaggerated perceptions of substance use among their peers (Beck & Treiman, 1996; Borsari & Carey, 2003; Callas, Flynn, & Worden, 2004; Dejong et al., 2006; Elek, Miller-Day, & Hecht, 2006), whereas other studies have indicated that norms-based approaches fail to achieve behavior change among students (Clapp, Lange, Russel, Shillington, & Voas, 2003; Wechsler et al., 2003). The present study seeks to further explore potential mechanisms by which social norms may influence behavior among American Indian (AI) and non-Indian youth.

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Normative influences may be especially important for understanding adolescent alcohol use. Specifically, prior research has differentiated between injunctive and descriptive norms. According to Cialdini, Reno, and Kallgren (1990), descriptive norms refer to perceptions about the prevalence of behavior in a particular population (i.e., what others are actually doing), while injunctive norms refer to the extent to which an individual perceives that others approve of the behavior. Past research shows that these two types of norms influence behavior differently (Borsari & Carey, 2003; Larimer, Turner, Mallet, & Geisner, 2004; Lee, Geisner, Lewis, Neighbors, & Larimer, 2007), indicating the need to differentiate between these two types. According to social learning theory (Bandura, 1986), the attitudes, beliefs, and behaviors of peers can be potent influences on an individual's own behavior; and ample evidence indicates that an adolescent's perceptions of peer behavior (i.e., descriptive norms) are robust predictors of adolescent alcohol use (D'Amico & McCarthy, 2006; Elek et al., 2006; Hawkins, Kosterman, Manguin, Catalano, & Arthur, 1997). Therefore, further exploration of the descriptive norm influence in adolescence is critical.

The Theory of Normative Social Behavior (TNSB; Rimal & Real, 2005) suggests that the influence of descriptive norms on behavioral intentions is moderated by three cognitive mechanisms: injunctive norms, outcome expectancies, and group identity. Outcome expectancies are beliefs that a behavior will lead to a certain outcome, while group identity reflects the extent to which individuals perceive similarity between themselves and their social group (Rimal & Real, 2005). These normative mechanisms may both directly influence individual behavior as well as amplify the effects of descriptive norms on behaviors. In a test of the TNSB, Rimal (2008) found that all three normative mechanisms moderated the relationship between descriptive norms for alcohol use and behavioral intentions to use alcohol. While all three cognitive mechanisms have been shown to be influential, the role of outcome expectancies was specifically examined in the present study. Because outcome expectancies are robust predictors of alcohol use (Callas et al., 2004; Jones, Corbin, & Fromme, 2001; Zamboanga, Horton, Leitkowski, & Wang, 2006) compared to injunctive norms and group identity, and because expectancies may be a more malleable target of an intervention to curb adolescent alcohol use, this study focused on this construct.

Outcome Expectancies

According to social cognitive theory (Bandura, 1977, 1986), an individual will be more likely to engage in a behavior which he or she perceives to be beneficial, i.e., a behavior that has positive outcome expectancies. Past studies have indicated that substance use outcome expectancies are influential in substance use behaviors including alcohol use (Callas et al., 2004; Jones et al., 2001; Zamboanga et al., 2006) and other substance use such as marijuana use (Boys et al., 1999; Neighbors, Geisner, & Lee, 2008), suggesting the importance of examining this construct. Furthermore, the TNSB (Rimal & Real, 2005) suggests that three types of outcome expectancies—benefits to the self, benefits to others, and anticipatory socialization—moderate the relationship between descriptive norms and behavioral intentions. The theory proposes that higher positive outcome expectancies will not only directly increase substance use, but will also increase the relationship between descriptive norms and substance use.

Benefits to Self

According to TNSB (Rimal & Real, 2005), the outcome expectancy of benefits to self refers to the extent to which an individual perceives that a behavior will lead to personal benefits. Common alcohol use outcome expectancies of benefits to the self include mood enhancement, relaxation, and stress reduction (Peele & Brodsky, 2000). Research has shown that positive outcome expectancies of benefits to the self predict alcohol use (Boys et al., 1999), in addition to moderating the relationship between descriptive norms and behavioral intentions to use alcohol (Rimal, Lapinski, Cook, & Real, 2005).

Benefits to Others

Perceptions of benefits to others, or the extent to which others benefit from the behavior, can also influence individual behavior. High levels of descriptive norms may be interpreted as evidence that others are benefitting from the behavior; individuals may then engage in the behavior in order to secure those benefits for themselves. In addition, threats of not securing benefits that others derive can exert a powerful influence on individual behavior (Kahneman & Tversky, 1984); individuals may engage in a behavior that they perceive benefits others so as not to deprive themselves of those benefits. Rimal and Real (2005) assessed benefits to others as perceptions that other people are deriving the same benefits that individuals perceive for themselves (e.g., stress reduction). Perceptions of benefits to others were shown to predict intentions to use alcohol, but only when benefits to self was excluded from their estimated model. When benefits to self was included in the model, the coefficient pertinent to benefits to others was negative. Rimal and Real (2005) explain this reversal by suggesting that students who intend to drink believe that benefits to themselves are not shared by others, and that they have special access to benefits and are less vulnerable to detrimental effects.

Anticipatory Socialization

Finally, the extent to which an individual perceives that a behavior will provide social benefits may also influence behavior. For example, individuals may believe that substance use may serve as a social lubricant and provide an activity to share and bond with peers. Social facilitation expectancies of alcohol use have been shown to be positively related to adolescent drinking (Boys et al., 1999; Smith, Goldman, Greenbaum, & Christiansen, 1995). Because peer relationships are so salient during adolescence, this construct is likely to be active during this developmental period. While socialization may be perceived as a benefit to the self for some individuals, anticipatory socialization is distinct given the social nature of this expectancy. According to the TNSB (Rimal & Real, 2005), benefits to the self are derived from perceptions of direct benefits to the self, and anticipatory socialization expectancies concern the perceptions of opportunities to engage in social interactions. In this sense, these two types of expectancies are conceptually distinct. In addition, Rimal and Real (2005) found evidence of distinct factors of benefits to self and anticipatory socialization when testing the factor structure of these outcome expectancies.

The Present Study

While prior research has examined the influence of social norms and outcome expectancies on alcohol use, insufficient attention has been paid to these influences across groups of

adolescents as defined by ethnicity. Due to their consistently higher rates of alcohol use, one group of particular interest is AI adolescents, who consistently report higher rates of alcohol use than their non-AI peers (Beauvais, 1992; Office of Applied Studies, 2006; Wallace et al., 2002). Given the chronic high risk of this group, it is essential to understand the normative environment for alcohol use among these youth. In one study with AI adolescents, Mitchell and Beals (2006) found that initial levels of outcome expectancies were related to subsequent increases in alcohol use, suggesting the importance of substance use outcome expectancies for these youth. Given their heightened risk, further research is needed to examine the relationship between descriptive norms and outcome expectancies on alcohol use within this population. Comparisons to white youth will help determine whether there are unique or common mechanisms in white and AI youth.

Prior tests of the TNSB (Rimal, 2008; Rimal & Real, 2005) have examined whether outcome expectancies moderate the relationship between descriptive norms and behavioral intentions to use alcohol, rather than actual use. However, research has indicated that behavioral intentions do not always lead to behaviors (Conner & Armitage, 1998; Sheeran, 2002). In the present study, we examined self-reported alcohol use as a function of descriptive norms and outcome expectancies for a sample of high school students who self-identified as either AI or white, and who attended the same schools on or near AI reservations. We hypothesized that descriptive norms and outcome expectancies would be positively related to alcohol use. In addition, we hypothesized that each outcome expectancy (benefits to self, benefits to others, and anticipatory socialization) would moderate the relationship between descriptive norms and alcohol use. In particular, we predicted that the effect of descriptive norms on alcohol use would be strongest for students with high positive outcome expectancies for use.

Methods

Participants

The current study was part of a larger ongoing epidemiological study of substance use among AI youth. Participants were AI and white students from schools on or near reservations that have at least 20 % AI youth enrolled. Yearly recruitment was based on a sampling scheme to approximate the percentage of AI youth residing in six geographic regions (Northwest, Northern Plains, Northeast, Southeast, Southern Great Plains, and Southwest). As incentives to participate, schools were paid $500 for participation and given a comprehensive report of survey findings within 2 months of the survey.

Three years of student data from 14 schools were used in the present study (2009–2010, 2010–2011, and 2011–2012 school years). Schools were located in Washington, Oregon, Montana, Arizona, South Dakota, Minnesota, Wisconsin, and Nevada. Ten of the schools were public schools, and four were Bureau of Indian Education schools. The specific identity of tribes and reservations was kept confidential. Ninth-through twelfth-grade students who self-identified as AI ($n = 1769$) or white ($n = 1018$) were included in the analyses for the present study. The mean age for students was 15.94 years ($SD = 1.24$). A breakdown of the number of students surveyed by ethnicity, gender, and grade is presented in Table 1.

Procedure

All survey procedures were approved by the Colorado State University's Institutional Review Board. A resolution of support was also required from the appropriate tribal authority or School Board prior to proceeding with an agreement with a school to survey their students. A teacher or school staff member at each school received Human Subjects certification by completing online and telephone IRB training prior to administration. This school staff member was responsible for supervising all survey administration as well as providing notification of any discrepancies in proper survey procedure. Parents were notified of survey administration through both a parent notification letter and a broad media release. Parents could elect to remove their child from the project by returning the signed notification to withdraw form to the school or by requesting verbally to the school principal that their child be withdrawn from participation. Less than one percent of students did not complete the survey due to lack of parental consent.

Prior to survey administration, teachers or other school staff read a brief set of instructions, including informing students that participation was voluntary and that they could leave any question blank. The surveys contained no identifying information, and procedures were used to ensure confidentiality. The students were given a class period to complete the survey, and students for whom parental consent was denied were moved to an area away from administration. Upon completion, students placed their completed surveys in a large envelope which was sealed after all students placed their survey in the envelope. School staff members were instructed to remain in an area of the classroom that precluded observation of student surveys.

Measures

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

Descriptive Norms—Descriptive norms for alcohol use were measured by a four-item scale (α = .78) including "Thinking about your classmates, how often do you think the average student gets drunk in a month?" rated on a 5-point scale (never, 1 time, 2–4 times, 5–9 times, 10 or more times), and "How many of your classmates get drunk at least once a month?" rated on a 5-point scale (none, a few, less than half, more than half, almost all). The descriptive norms scale scores were computed by taking the mean of the items. Higher scores reflect stronger levels of descriptive norms for alcohol use.

Outcome Expectancies—Perceived benefits to the self for alcohol were measured with three items (α = .94). Students were asked to indicate their agreement with a stem ("Drinking alcohol…") followed by three statements ("makes me feel good", "is fun", "helps me feel better"). Benefits to others for alcohol were measured with three similar ending items (α = .95) in which students were asked to indicate their agreement with a stem ("For most others, drinking alcohol…"). Anticipatory socialization for alcohol was measured with four items (α = .88). Students were asked to indicate their agreement with "Drinking with friends is a part of being in a group", "Students my age are expected to

drink", "Drinking alcohol is an important part of being with friends", and "Drinking alcohol allows students to make friends." Scale scores were computed by taking the mean of the items and, again, higher scores reflect higher levels of expectancies.

Confirmatory factor analysis (CFA) was conducted to assess the measurement of these three factors, taking into account the nested nature of the data (Muthén & Muthén, 2008). CFA results showed a good fit, with a Comparative Fit Index of .97 and a Standardized Root Mean Square Residual of .03.

Alcohol Use—Three categorical (outcomes of 0 or 1) dependent variables were used to measure alcohol use, each representing common measures of prevalence. Last-month alcohol use measured whether a student drank alcohol in the last month while last-month drunkenness measured whether a student got drunk in the last month. Binge drinking measured whether a student had five or more drinks in a 2-h period in the last 2 weeks.

Control Variables—Control variables included in each model were gender, grade, and ethnicity. Gender was dummy coded so that a female was coded as 1 and a male as 0; grade was measured as a continuous variable from 9 to 12; and ethnicity was dummy coded so that AI was coded as a 1 and white as a 0. Table 2 contains the means and standard deviations by ethnicity for all variables.

Data Analysis

Because students are nested within schools, non-independence of observations within communities/schools was accounted for by using multilevel techniques. The dichotomous alcohol use variables were analyzed with HLM6 using Bernoulli's logistic regression (Raudenbush & Bryk, 2002). The population-average odds ratios (OR) or relative odds, are reported for these models. All variables except for the demographics were grandmean-centered. Interaction terms between the control variables and the independent variables of interest (i.e., outcome expectancies and descriptive norms) were tested using HLM's multivariate hypothesis testing feature (Bryk, Raudenbush, & Congdon, 2004). Because all tests showed that the variables were non-significant in predicting each measure of alcohol use, they were excluded from the model. The first set of models (one model for each dependent variable) included the control variables and descriptive norms. The second set included all three outcome expectancies and their interactions with descriptive norms. Finally, the third set of models included only one outcome expectancy variable, benefits to self, and its interaction with descriptive norms.

Missing data varied from a low of .4 % for binge drinking to a high of 7.4 % for descriptive norms. To account for missing data, multiple imputation (Shafer & Graham, 2002) was completed using ICE in Stata software, Version 10.0 (Royston, 2004, 2005, 2007). ICE imputes by chained equations, and its major strength is that there is no multivariate joint distribution assumption, thus allowing different types of variables to be imputed together. Simulation studies have shown that in practice it performs well (Royston, 2005). In total, five imputed data sets were created and analyzed, and the parameter estimates were then combined using procedures outlined by Rubin (1987).

Results

Table 3 contains correlations by ethnicity between measures assessing the predictors of interest: descriptive norms, benefits to self, benefits to others, and anticipatory socialization. Table 4 presents population-average odds ratios (OR) for last-month alcohol use (OR_{LMA}), last-month drunkenness (OR_{LMD}), and binge drinking (OR_{BD}). For all models, the intercept represents a white male with mean levels of all other variables.

Model 1: Control Variables and Descriptive Norms

Descriptive norms was positively related to the likelihoods of last-month alcohol use, last-month drunkenness, and binge drinking (OR_{LMA} = 2.39; OR_{LMD} = 2.85; OR_{BD} = 2.85). Comparing students who were similar in other ways but differed by one standard deviation in descriptive norms showed that the odds of last-month alcohol use for the students with higher descriptive norms was, on average, 2.06 times the odds of alcohol use for students with a lower level of descriptive norms. Similarly, the odds of last-month drunkenness and binge drinking for the students with the higher descriptive norms was, on average, 2.38 times higher than the comparable odds for students with lower descriptive norms. No differences were found in the likelihood of last-month alcohol use by gender, grade or ethnicity. Students in higher grades were slightly more likely to have been drunk in the last month (OR_{LMD} = 1.08). AI students were more likely to have been drunk in the last month (OR_{LMD} = 1.27), and females were both less likely than males to have been drunk in the last month and to have been a binge drinker in the last 2 weeks (OR_{LMD} = .71; OR_{BD} = .59).

Model 2: Control Variables, Descriptive Norms, and Outcome Expectancies

As in the previous models, descriptive norms was positively related to the likelihood of last-month alcohol use, last-month drunkenness, and binge drinking (OR_{LMA} = 1.87; OR_{LMD} = 2.13; OR_{BD} = 2.17), although the odds ratios were somewhat smaller than those estimated in the first set of models. Benefits to self was positively associated with the dependent variables (OR_{LMA} = 4.16; OR_{LMD} = 4.09; OR_{BD} = 3.66). In addition, the odds ratios for the interaction between benefits to self and descriptive norms were significantly greater than 1 for each dependent variable (OR_{LMA} = 1.29; OR_{LMD} = 1.41; OR_{BD} = 1.28), suggesting that benefits to self positively moderated the relationship between descriptive norms and the likelihood of last-month alcohol use, last-month drunkenness, and 2-week binge drinking.

The model produced unexpected results related to benefits to others. The coefficient associated with benefits to others for each dependent variable was negative, resulting in odds ratios significantly less than 1 (OR_{LMA} = .50, OR_{LMD} = .48; OR_{BD} = .44). Although consistent with Rimal and Real's (2005) results, we felt that such a clear contradiction to TNSB warranted further exploration. Thus, we estimated two new models for each dependent variable (results not shown) in which, in one model, benefits to self was the sole expectancy variable, and in an alternative model, benefits to others was the sole expectancy variable. In each model, the interaction of the expectancy variable and descriptive norms was included. We found that in the first model, benefits to self and its interaction with descriptive norms were still positively related to each dependent variable; however, the odds ratios for benefits to self were reduced from those seen in model 2 (OR_{LMA} = 2.57; OR_{LMD} = 2.46;

OR_{BD} = 2.13). On the other hand, when benefits to others was included as the only outcome expectancy variable, the sign of the coefficient on benefits to others reversed to positive, and for last-month alcohol use and last-month drunkenness, it was significantly different than zero (OR_{LMA} = 1.26; OR_{LMD} = 1.27). For all three dependent variables, the coefficients of the interaction term between benefits to others and descriptive norms were not significantly different than zero.

These results may be a manifestation of the reversal paradox where a reversal or change in magnitude in the association of two variables occurs when a third variable is statistically controlled for (Arah, 2008; Tu, Gunnell, & Gilthorpe, 2008). The results here meet the statistical criteria for a suppression effect, in that (1) benefits to self and benefits to others were positively correlated (r = .71); (2) the coefficients related to benefits to self and benefits to others became greater in absolute value when included in the same model; and (3) the overall predictability of the equation increased as seen with a significant log-likelihood ratio when benefits to others was included in the model. In addition, the large increase in the absolute value of each coefficient related to benefits to self and benefits to others was consistent with the high correlation between these variables. As noted by MacKinnon, Krull, and Lockwood (2000), these findings suggest that our model, in terms of the inclusion of benefits to others, was incorrectly specified. Therefore, we excluded benefits to others from the next models estimated.

Finally, the odds ratios for anticipatory socialization and its interaction with descriptive norms were not significantly different from 1 for all dependent variables. Likelihood ratio tests revealed that the fit was not significantly worse when these two variables were excluded from the model.

Model 3: Control Variables, Descriptive Norms, and Benefits to Self

Based on the results above, the final models excluded anticipatory socialization and benefits to others, in addition to their interactions with descriptive norms.

Males and AI students were significantly more likely to have gotten drunk in the last month or to have binge drunk, although grade was not significantly related to any of the dependent variables. Descriptive norms significantly increased the likelihood of engaging in each alcohol behavior (OR_{LMA} = 1.66; OR_{LMD} = 1.92; OR_{BD} = 1.81), although the odds ratios were reduced from those specified in Model 1 where benefits to self was not included. Benefits to self was positively related to the dependent variables; however, the odds ratios were reduced from their levels in Model 2 (OR_{LMA} = 2.64; OR_{LMD} = 2.46; OR_{BD} = 2.01). In addition, the odds ratios for the interaction between benefits to self and descriptive norms were significantly greater than 1 for last-month alcohol use and binge drinking (OR_{LMA} = 1.19; OR_{BD} = 1.23), but not for last-month drunkenness (OR_{LMD} = 1.16). These results suggest that benefits to self positively moderated the relationship between descriptive norms and the likelihood of last-month alcohol use and 2-week binge drinking. However, the moderation effect was not large.

Discussion

This study makes several important contributions to the literature regarding the normative influences and the mechanisms by which these influences affect behaviors across groups of adolescents. Previous research has suggested that descriptive norms can affect behaviors, including substance use (Beck & Treiman, 1996; Callas et al., 2004; Elek et al., 2006). Consistent with previous research and as predicted by our hypothesis, descriptive norms and the outcome expectancy of benefits to self were positively related to last-month alcohol use, last-month drunkenness, and binge drinking among both AI and white adolescents. In addition, benefits to self moderated the relationship between descriptive norms and last-month alcohol use and binge drinking; however, this moderation effect was not seen for last-month drunkenness. In line with the TNSB (Rimal & Real, 2005), the deleterious effects of strong descriptive norms were enhanced among students with perceptions of benefits to self. Not only were students who had higher perceived benefits to self more likely to report alcohol use, this effect was enhanced when the student also perceived stronger descriptive norms for use.

Contrary to the TNSB, anticipatory socialization was not directly related to alcohol use outcomes, and did not moderate the relationship between descriptive norms and alcohol use outcomes among either AI or white students living on or near reservations. Further, the examination of benefits to others yielded unexpected results. When examined independently from other outcome expectancies, benefits to others was positively related to last-month alcohol use and last-month drunkenness, but did not moderate the relationship between norms and alcohol use. When examined in conjunction with the other outcome expectancies, this effect was reversed and higher perceived benefits to others was inversely associated with the likelihood of alcohol use. Benefits to others may be a suppressor variable and further research is needed to elucidate its influence on adolescent alcohol use.

In the present study, the TNSB (Rimal & Real, 2005) was tested in the context of a sample at particularly high risk for alcohol use, AI and white adolescents. However, a main tenet of this theory, which suggests the moderating effects of outcome expectancies on the relationship between descriptive norms and alcohol use, was not fully supported for all outcome expectancies (i.e., benefits to others and anticipatory socialization). There may be a number of explanations for these findings. First, prior tests of the TNSB have modeled the effects of descriptive norms and outcome expectancies on behavioral intentions rather than actual behavior. In the present study, we examined these processes for reported alcohol use. It is possible that anticipatory socialization only acts as a moderator when individuals are reporting intentions for future behaviors. Since intentions are imperfect proxies for behavior, anticipatory socialization may not moderate the relationship between descriptive norms and reported alcohol use. In addition, the sample of the current study may also have influenced this test of the TNSB (Rimal & Real, 2005). It is also possible that among this population, which includes AI and white adolescents living on or near reservations, anticipatory socialization is not a motivator for adolescent alcohol use, although research has shown this outcome expectancy to be a predictor of alcohol use among majority youth (Boys et al., 1999; Smith et al., 1995). Given the high rate of alcohol use among adults who live on or near AI reservations, the effects of anticipatory socialization and benefits to others as

motivations for drinking may be diminished. Further research should explore motivations for alcohol use among AI and white adolescents living on or near reservations, as alcohol use among these youth may be better predicted by other constructs related to motivation. Finally, other theories may better explain alcohol use among this population by the inclusion of additional predictors. For example, the theory of planned behavior (Ajzen, 1985, 1987) includes attitudes, normative influences, and perceived behavioral control to predict intentions and behaviors. Future research should examine normative influence processes from alternative theoretical perspectives to illuminate important predictors for these youth.

We found that male and AI students reported more alcohol use than females and white students. This is consistent with previous research indicating higher prevalence of alcohol use among AI adolescents compared to their white peers (Beauvais, 1992; Hawkins, Cummins, & Martlatt, 2004; Wallace et al., 2003), as well as higher rates of alcohol use among males than females during middle and late adolescence (Wallace et al., 2003). However, we note that the mechanisms of normative influence did not appear to differ by ethnicity. Both direct and moderating effects of outcome expectancies operated similarly among AI and white students. Since youth attended the same schools on or near reservations, however, they may have been subjected to similar environmental influences. Future research could further examine these differences among AI and white students living near reservations in order to clarify the effects of gender and ethnicity on normative influences.

Limitations

One limitation of this study was the cross-sectional nature of our sample, which prohibited determination of causality. It is unknown whether descriptive norms and outcome expectancies caused behavior change, or if engaging in a particular behavior caused changes in perceptions of descriptive norms and outcome expectancies. On the other hand, the success of norms-based interventions (Dejong et al., 2006; Turner, Perkins, & Bauerle, 2008) suggests that a focus on norms may produce behavior change and foster healthy development. Future research into normative influence should examine these factors within a longitudinal context. In addition, benefits to self in the present study moderated the relationship between descriptive norms and alcohol use outcomes; however, this effect was small and considerable variance was left to be explained by other constructs not included in our models.

In addition, our study utilized self-report questionnaires to assess students' illegal behavior (i.e., underage alcohol use), and their reports were not externally verified. However, surveys were administered anonymously, increasing students' confidence that they could respond honestly to the survey items. We have developed multiple tests of validity that assess for profiles of exaggeration and minimization of response, as well as profiles of random responding. Less than 2 % of surveys were removed from the sample based on these tests, suggesting that students felt confident in the confidentiality of the survey administration procedures.

It is also important to consider regional variations in substance use among AI adolescents as students were sampled from eight states in this sample (Plunkett & Mitchell, 2000). In the present study, adolescents were living on or near reservations, which limits generalizability to other groups. The relationships among the constructs we examined may be quite different when examined within the context of urban AI adolescents. In regard to geographic regional differences, research suggests that AI regional group membership accounts for only a small amount of variance in alcohol use (Spicer, Novins, Mitchell, & Beals, 2003); therefore, the findings of this present study are likely generalizable to AI adolescents residing on or near reservations, but not to urban AI adolescents.

Implications

Despite these limitations, the results of our study indicate the harmful effects of both strong perceived descriptive norms for alcohol use and positive benefits to self from alcohol use on adolescents' use of alcohol among both AI and white high school students. Furthermore, this study also demonstrated the influential role played by benefits to self on the relationship between descriptive norms and alcohol use; the effect of descriptive norms became more robust as perceived benefits to the self increased. These findings are critically important because they suggest that adolescents are at a heightened risk for alcohol use given the presence of both strong descriptive norms and perceived positive benefits to self. These results can inform prevention efforts aimed at reducing alcohol use among adolescents living on or near reservations. Social norms approaches to reducing alcohol use have yielded mixed results (Clapp et al., 2003; Dejong et al., 2006; Wechsler et al., 2003), and the findings in this study suggest that campaigns may be improved by including a focus on perceived benefits to self. By taking this mechanism into account, campaigns may see increased effectiveness in reducing alcohol consumption. Campaigns should focus on not only correcting misperceptions of peer alcohol consumption (i.e., descriptive norms), but should also aim to reduce perceived benefits from alcohol use to ultimately reduce alcohol consumption.

In sum, the results of the current study highlight the importance of both descriptive norms and the outcome expectancy of benefits to self on adolescent alcohol use. In this study, the role of outcome expectancies on the relationship between descriptive norms and alcohol use was examined among AI and white adolescents, a population at particularly high risk for substance use. Both descriptive norms and benefits to self may constitute potential points of intervention to reduce the risk of alcohol use among adolescents, and future research should explore the effects of interventions that target these two factors.

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References

Ajzen I (1985). From intentions to actions: A theory of planned behavior. In Kuhi J & Beckmann J (Eds.), Action-control: From cognition to behavior (pp. 11–39). Heidelberg: Springer.

Ajzen I (1987). Attitudes, traits, and actions: Dispositional prediction of behavior in personality and social psychology. In Berkowitz L (Ed.), Advances in experimental social psychology (Vol. 20, pp. 1–63). New York: Academic Press.

Arah O (2008). The role of causal reasoning in understanding Simpson's paradox, Lord's paradox, and the suppression effect: Covariate selection in the analysis of observational studies. Emerging Themes in Epidemiology, 5(1), 5. [PubMed: 18302750]

Bandura A (1977). Social learning theory. Oxford, England: Prentice-Hall.

Bandura A (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Beauvais F (1992). Comparison of drug use rates for reservation Indian, non-reservation Indian and Anglo youth. American Indian and Alaska Native Mental Health Research, 5, 13–31. [PubMed: 1420537]

Beck KH, & Treiman KA (1996). The relationship of social context of drinking, perceived social norms, and parental influence to various drinking patterns of adolescents. Addictive Behaviors, 21(5), 633–644. [PubMed: 8876762]

Borsari B, & Carey KB (2003). Descriptive and injunctive norms in college drinking: A meta-analytic integration. Journal of Studies on Alcohol and Drug, 64(3), 331–341.

Boys A, Marsden J, Griffiths P, Fountain J, Stillwell G, & Strang J (1999). Substance use among young people: The relationship between perceived functions and intentions. Addiction, 94, 1043–1050. [PubMed: 10707442]

Bryk AS, Raudenbush SW, & Congdon R (2004). HLM 6 for Windows [Computer software] (Version 6.02) Lincolnwood, IL: Scientific Software International.

Callas PW, Flynn BS, & Worden JK (2004). Potentially modifiable psychosocial factors associated with alcohol use during early adolescence. Addictive Behaviors, 29(8), 1503–1515. [PubMed: 15451120]

Cialdini RB, Reno RR, & Kallgren CA (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. Journal of Personality and Social Psychology, 58(6), 1015–1026.

Clapp JD, Lange JE, Russel C, Shillington A, & Voas RB (2003). A failed norms social marketing campaign. Journal of Studies on Alcohol, 64(3), 409–414. [PubMed: 12817831]

Conner M, & Armitage CJ (1998). The theory of planned behavior: A review and avenues for further research. Journal of Applied Social Psychology, 28, 1430–1464.

D'Amico E, & McCarthy D (2006). Escalation and initiation of younger adolescents' substance use: The impact of perceived peer use. Journal of Adolescent Health, 39, 481–487.

DeJong W, Schneider S, Towvim L, Murphy MJ, Doerr EE, Simonsen NR, et al. (2006). A multisite randomized trial of social norms marketing campaigns to reduce college student drinking. Journal of Studies on Alcohol, 67(6), 868–879. [PubMed: 17061004]

Elek E, Miller-Day M, & Hecht ML (2006). Influences of personal, injunctive, and descriptive norms on early adolescent substance use. Journal of Drug Issues, 36(1), 147–172.

Hawkins EH, Cummins LH, & Marlatt G (2004). Preventing substance abuse in American Indian and Alaska native youth: Promising strategies for healthier communities. In Marlatt G & Witkiewitz K (Eds.), Addictive behaviors: New readings on etiology, prevention, and treatment (pp. 575–621). Washington, DC: American Psychological Association.

Hawkins JD, Kosterman R, Maguin E, Catalano RF, & Arthur MW (1997). Substance use and abuse. In Ammerman RT & Hersen M (Eds.), Handbook of prevention and treatment with children and adolescents: Intervention in the real world context (pp. 203–237). New York: John Wiley & Sons, Inc.

Jones BT, Corbin W, & Fromme K (2001). A review of expectancy theory and alcohol consumption. Addiction, 96(1), 57–72. [PubMed: 11177520]

Kahneman D, & Tversky A (1984). Choices, values, and frames. American Psychologist, 39(4), 341–350.

Larimer ME, Turner AP, Mallett KA, & Geisner IM (2004). Predicting drinking behavior and alcohol-related problems among fraternity and sorority members: Examining the role of descriptive and injunctive norms. Psychology of Addictive Behavior, 18(3), 203–212.

Lee CM, Geisner I, Lewis MA, Neighbors C, & Larimer ME (2007). Social motives and the interaction between descriptive and injunctive norms in college student drinking. Journal of Studies on Alcohol and Drugs, 68(5), 714–721. [PubMed: 17690805]

MacKinnon DP, Krull JL, & Lockwood CM (2000). Equivalence of the mediation, confounding and suppression effect. Prevention Science, 1(4), 173–181. [PubMed: 11523746]

Mitchell CM, & Beals J (2006). The development of alcohol use and outcome expectancies among American Indian young adults: A growth mixture model. Additive Behaviors, 31, 1–14.

Muthén BO, & Muthén L (2008). Mplus User's Guide. Los Angeles, CA: Muthén & Muthén.

Neighbors C, Geisner IM, & Lee CM (2008). Perceived marijuana norms and social expectancies among entering college student marijuana users. Psychology of Addictive Behaviors, 22(3), 433–438. [PubMed: 18778137]

Oetting E, & Beauvais F (1990). Adolescent drug use: Findings of national and local surveys. Journal of Consulting and Clinical Psychology, 58(4), 385–394. [PubMed: 2212174]

Office of Applied Studies. (2006). Results from the 2005 national survey on drug use and health: National findings (DHHS Publication No. 06–4194, NSDUH Series H-30). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Peele S, & Brodsky A (2000). Exploring psychological benefits associated with moderate alcohol use: A necessary corrective to assessments of drinking outcomes? Drug and Alcohol Dependence, 60(3), 221–247. [PubMed: 11053757]

Plunkett M, & Mitchell CM (2000). Substance use rates among American Indian adolescents: Regional comparisons with monitoring the future high school seniors. Journal of Drug Issues, 30, 575–591.

Raudenbush SW, & Bryk AS (2002). Hierarchical linear models: Applications and data analysis methods (2nd ed.). Thousand Oaks, CA: Sage Publications.

Rimal RN (2008). Modeling the relationship between descriptive norms and behaviors: A test and extension of the theory of normative social behavior (TNSB). Health Communication, 23, 103–116. [PubMed: 18443998]

Rimal RN, Lapinski MK, Cook RJ, & Real K (2005). Moving toward a theory of normative influences: How perceived benefits and similarity moderate the impact of descriptive norms on behaviors. Journal of Health Communication, 10(5), 433–450. [PubMed: 16199387]

Rimal RN, & Real K (2005). How behaviors are influenced by perceived norms: A test of the theory of normative social behavior. Communication Research, 32(3), 389–414.

Royston P (2004). Multiple imputation of missing values. Stata Journal, 4(3), 227–241.

Royston P (2005). Multiple imputation of missing values: Update of ice. Stata Journal, 5(4), 527–536.

Royston P (2007). Multiple imputation of missing values: Further update of ice, with an emphasis on interval censoring. Stata Journal, 7(4), 445–464.

Rubin DB (1987). Multiple imputation for nonresponse in surveys. New York: John Wiley & Sons Inc.

Shafer J, & Graham L (2002). Missing data: Our view of the state of the art. Psychological Methods, 7, 147–177. [PubMed: 12090408]

Sheeran P (2002). Intention–behavior relations: A conceptual and empirical review. In Hewstone M & Stroebe W (Eds.), European review of social psychology (Vol. 12, pp. 1–36). Chichester, England: Wiley.

Smith G, Goldman M, Greenbaum P, & Christiansen B (1995). Expectancy for social facilitation from drinking: The divergent paths of high-expectancy and low-expectancy adolescents. Journal of Abnormal Psychology, 104, 32–40. [PubMed: 7897051]

Spicer P, Novins DK, Mitchell CM, & Beals J (2003). Aboriginal social organization, contemporary experience, and American Indian adolescent alcohol use. Journal of Studies on Alcohol, 64, 450–457. [PubMed: 12921186]

Tu YK, Gunnell D, & Gilthorpe M (2008). Simpson's Paradox, Lord's Paradox, and Suppression Effects are the same phenomenon—the reversal paradox. Emerging Themes in Epidemiology, 5(1), 2. [PubMed: 18211676]

Turner J, Perkins W, & Bauerle J (2008). Declining negative consequences related to alcohol misuse among students exposed to a social norms marketing intervention on a college campus. Journal of American College Health, 57(1), 85–93. [PubMed: 18682350]

Wallace JM, Bachman JG, O'Malley PM, Johnston JD, Schulenberg JE, & Cooper SM (2002). Tobacco, alcohol, and illicit drug use: Racial and ethnic differences among U.S. high school seniors, 1976–2000. Public Health Reports, 117(Suppl. 1), 67–75.

Wallace JM Jr, Bachman JG, O'Malley PM, Schulenberg JE, Cooper SM, & Johnston LD (2003). Gender and ethnic differences in smoking, drinking and illicit drug use among American 8th, 10th and 12th grade students, 1976–2000. Addiction, 98(2), 225. [PubMed: 12534428]

Wechsler H, Nelson TF, Lee J, Seibring M, Lewis C, & Keeling RP (2003). Perception and reality: A national evaluation of social norms marketing interventions to reduce college students' heavy alcohol use. Journal of Studies on Alcohol, 64(4), 484–494. [PubMed: 12921190]

Zamboanga BL, Horton NJ, Leitkowski LK, & Wang SC (2006). Do good things come to those who drink? A longitudinal investigation of drinking expectancies and hazardous alcohol use in female college athletes. Journal of Adolescent Health, 39, 229–236.

Table 1

Participants by ethnicity, grade, and gender

Grade	White			American Indian			Total
	M	F	Missing	M	F	Missing	
9th	119	123	11	262	247	22	784
10th	149	117	11	212	216	17	722
11th	124	138	8	206	226	13	715
12th	111	96	11	158	174	16	566
Total	503	474	41	838	863	68	2,787

M = male, F = female

Table 2

Means and standard deviations (*SD*) for variables by ethnicity

Measure	American Indian		White	
	Mean	*SD*	Mean	*SD*
Last-month alcohol use	.29	.45	.38	.49
Last-month drunkenness	.21	.40	.22	.41
Binge drinking	.17	.37	.16	.37
Norms (1–4.5)[a]	2.51	.83	2.61	.82
Benefits to self (1–5)[a]	2.85	1.14	2.98	1.18
Benefits to others (1–5)[a]	3.31	1.19	3.41	1.17
Anticipatory socialization (1–5)[a]	2.22	.98	2.23	.98
Female	.51	.50	.49	.50
Grade	10.34	1.11	10.44	1.08

[a]Numbers in parentheses represent the range of the variable

Table 3

Correlations among predictor measures, by white versus American Indian adolescents

Predictor measures	1	2	3	4
1. Norms	–	.44***	.39***	.34***
2. Benefits to self	*.39***	–	.70***	.56***
3. Benefits to others	*.41***	*.73***	–	.44***
4. Anticipatory socialization	*.33***	*.58***	*.42***	–

Coefficients above the diagonal are for American Indian students. Italicized coefficients below the diagonal are for white students

*** $p < .001$

Table 4

Odds ratios for last-month alcohol use, last-month drunkenness, and binge drinking

Variable	Last-month alcohol use			Last-month drunkenness			Binge drinking		
	1	2	3	1	2	3	1	2	3
Intercept	.51**	0.41**	.41**	.22**	.15**	.16**	.18**	.12**	.14**
Descriptive norms (DN)	2.39**	1.87**	1.66**	2.85**	2.13**	1.92**	2.85**	2.17**	1.81**
Benefits to self	–	4.16**	2.64**	–	4.09**	2.46**	–	3.66**	2.01**
Benefits to others	–	.50**	–	–	.48**	–	–	.44**	–
Anticipatory socialization	–	.97	.94	–	1.05	.99	–	1.11	1.03
DN * benefits to self	–	1.29**	1.19*	–	1.41**	1.16	–	1.28*	1.23*
DN * benefits to others	–	.84*	–	–	.74**	–	–	.84*	–
DN * anticipatory socialization	–	.95	.95	–	.94	.94	–	.94	.97
American Indian	.90	.80	.89	1.27**	1.22	1.35*	1.27	1.26	1.34*
Female	.88	.97	.88	.71**	.77*	.70**	.59**	.67**	.60**
Grade	1.05	1.03	1.03	1.08**	1.08	1.06	1.00	1.00	.98

*$p < .05$;

**$p < .01$ where H0: Odds ratio. = 1