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Linking Life Skills and Norms With Adolescent Substance Use and Delinquency in South Africa

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Abstract

We examined factors targeted in two popular prevention approaches with adolescent drug use and delinquency in South Africa. We hypothesized adolescent life skills to be inversely related, and perceived norms to be directly related to later drug use and delinquency. Multiple regression and a relative weights approach were conducted for each outcome using a sample of 714 South African adolescents ages 15 to 19 years ($M = 15.8$ years, 57% female). Perceived norms predicted gateway drug use. Conflict resolution skills (inversely) and perceived peer acceptability (directly) predicted harder drug use and delinquency. The “culture of violence” within some South African schools may make conflict resolution skills more salient for preventing harder drug use and delinquency.

According to the 2001 South Africa Census, young people ages 10–19 comprise 22% of the country’s population (Statistics South Africa, 2003). South African adolescents are developing within the post-Apartheid context of major political, economic, and social changes (Naude, 2001; Parry, Plüddemann, Louw, & Leggett, 2004), including racial discrimination and increasing violence (Brook, Morojele, Pahl, & Brook, 2006). This context promotes a constellation of risks for the development of adolescent substance use and delinquency and threatens the public health of South Africa.

Survey results tell a sobering tale. According to a national survey of youth and young adults ages 15–24 in South Africa, over 50% have tried alcohol and over 10% have tried drugs in their lifetime (Pettifor et al., 2004). Results from the 2008 National Youth Risk Behaviour Survey (NYRBS) conducted among 8th- to 11th-grade students showed lifetime substance use rates of 49.6% for alcohol, 29.5% for cigarettes, 12.7% for marijuana, 12.2% for

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inhalants, and 6.6% for methamphetamines (Reddy et al., 2010). Adolescent marijuana and alcohol use is more prevalent in the U.S. than in South Africa (Reddy, Resnicow, Ouardien, & Kambaran, 2007). However, rates of lifetime “hard” drug use (cocaine, heroin, injectable drugs, and methamphetamines) are higher in South Africa. The increasing prevalence of methamphetamine use among South African adolescents and adults in recent years is of particular concern to public health (Plüddemann, Myers, & Parry, 2008).

Few empirical research or surveillance data exist on delinquent behaviors among South African adolescents. The results of the 2008 NYRBS indicate that 21.0% of South African adolescents reported getting into a physical fight at school in the past 6 months (Reddy et al., 2010). Significantly more South African males than females reported carrying weapons (such as gun, knife, “panga” or “kierrie”—South African terms for long knives or sticks, respectively) and being involved in a physical fight in the past month (Reddy et al., 2010). Some research also suggests that substance use co-occurs with delinquency among South African adolescents (Flisher, Ziervogel, Chalton, Leger, & Roberts, 1996). Because adolescent substance use and delinquency may share common risk factors (Hawkins, Jenson, Catalano, & Lishner, 1988), it is important to further the research in this area.

In Western samples, two successful approaches for preventing adolescent substance use and delinquency are the promotion of life skills and changing youths’ perception of social norms. The life skills promotion approach builds adolescents’ competencies for interpersonal relations, decision-making, critical thinking, and emotional coping skills (Mangrulkar, Whitman, & Posner, 2001). The Life Skills Training (LST) program developed by Botvin and colleagues in the U.S. is considered a successful intervention for reducing adolescent substance use (Botvin & Griffin, 2004) and delinquency (Botvin, Griffin, & Nichols, 2006). LST is theoretically based in social learning theory (Bandura, 1977) and problem behavior theory (Jessor & Jessor, 1977). From these perspectives, adolescent substance use and delinquency are behaviors learned from the interplay of adolescents’ contextual and personal risk factors.

Social norms approaches are based on the idea that perceptions of normal peer behaviors are important predictors of those behaviors (Fishbein & Ajzen, 1975). Hansen and colleagues showed that perceptions of peer norms regarding substance use are powerful predictors of young people’s own use and cessation of use (Hansen & McNeal, 2001). They also showed that a program designed to correct (lower) misperceptions of the prevalence and acceptability of peer substance use reduces young people’s own use (Hansen & Graham, 1991). Further, youth beliefs about substance use prevalence and acceptability mediated the beneficial effects of that substance abuse prevention program (Donaldson, Graham, & Hansen, 1994).

In South Africa, the life skills approach is part of a compulsory school subject called Life Orientation which prepares youth to “live meaningfully and successfully in a rapidly changing society” (Department of Basic Education, 2011). In their survey of youth-serving, substance-use prevention programs, Harker and colleagues (Harker, Myers, & Perry, 2008) noted that although 69% of school-based programs surveyed provided life skills training, this type of training is underrepresented among community-based programs in South Africa and may be a productive focus for future prevention efforts.

Current Study

Our overall aim is to conduct etiological research that contributes to the development of preventive interventions targeting adolescent substance use and delinquency in South Africa. We examine factors that are targeted in two popular prevention approaches (promotion of

life skills and changing social norms around substance use). We hypothesize that an adolescent's positive skills in anger and anxiety management, decision-making and risk management, and conflict resolution will be negatively associated with later substance use and delinquency. We also hypothesize that perceived acceptability and perceived prevalence of alcohol, cigarette, and marijuana use among peers will be positively associated with later substance use and delinquency. Substance use in South Africa consistently differs by gender, with males more likely to have used any substances and reporting a higher prevalence of ever using substances than females (Madu & Matla, 2003; Reddy et al., 2010), therefore we also include gender in the model.

Method

Procedures

Data for the current study came from the control group sample of an efficacy trial of HealthWise: South Africa (HWSA), a school-based prevention program for 8th and 9th graders conducted from 2004–2008 (Caldwell et al., 2004; Wegner et al., 2008). The goals of HWSA are to reduce adolescent substance use and risky sex and to promote positive leisure use. HWSA was adapted specifically to the South African context although the program model integrates aspects of prevention programs developed in the U.S. The theoretical framework and conceptualization of HWSA, and the process to culturally adapt the program to South Africa are described elsewhere (Caldwell et al., 2004; Wegner, Flisher, Caldwell, Vergnani, & Smith, 2008). HWSA is the result of an international collaboration between faculty at The Pennsylvania State University (PSU) in the United States, and in South Africa, The University of the Western Cape (UWC), The University of Cape Town (UCT), and the Western Cape Education Department. PSU has been the primary recipient of grant funds for this project from the National Institute on Drug Abuse (NIDA); UWC faculty and staff have assumed the primary role of program coordination and maintaining relationships with the schools, teachers, and students involved in the HWSA trial. Members of all three academic institutions have participated in data analysis and the dissemination of findings.

Parent consent and youth assent to participate in the study were collected prior to data collection. Surveys were administered using handheld computers (Palm Pilots) at the beginning and end of each school year of the study. Study protocols and data collection instruments were approved by the human subjects research review boards at both The Pennsylvania State University in the U.S. and Stellenbosch University in South Africa, which at the time served as the IRB body for research conducted through UWC.

Participants

Four treatment schools were randomly selected from secondary schools in the Mitchell's Plain area that were deemed by local project collaborators as being functionally able to participate (6 of 25 secondary schools were excluded from the selection pool due to concerns regarding severe overcrowding, safety, and high levels of school disorganization). Five comparison schools were then matched with treatment schools based on demographic and other socioeconomic characteristics. The present study sample consisted of 714 adolescents from Cohort 3 ($M = 15.8$ years at the end of 9th grade, 57% female). The majority (94%) of youth in the current study sample are Coloured, a racial category used in South Africa for persons of mixed European, African, and Asian ancestry. Students reside in the Mitchell's Plain township of South Africa where 48% of households earn less than the household subsistence level of R19,200 (\$2743 US) per year (Statistics South Africa, 2003). The most commonly spoken language at home is English; nearly 60% speak both English and Afrikaans at home.

Measures

All alpha values reported in this article were calculated in our data for the scales described below.

Life skills—Students reported their level of confidence in their ability to use, as well as their use of, personal and social skills. Ten items were adapted from the survey used to evaluate the Life Skills Training program (Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990), two items from each of five skill areas: Anxiety Management (“When I feel anxious or nervous, I imagine myself being calm and relaxed”); Anger Management (“I am confident I can control my anger”); Decision Making (“I am confident I make good decisions”); Risk Avoidance (“I am confident I can avoid risky situations”); and Conflict Resolution (“I think it is important to resolve conflicts (fights or arguments) peacefully”). Students rated these questions on a scale of 0 (strongly disagree) to 4 (strongly agree). Preliminary analysis showed that Anxiety and Anger Management items were highly correlated and did not represent distinct constructs in our data. Similarly, Decision Making and Risk Avoidance items were highly correlated and did not represent distinct constructs in our data. Factor analysis of the 10 items suggested that the 10 items loaded on just three factors; thus we standardized and averaged the items to form three scales: (1) Anxiety/and Anger Management (4 items, $\alpha = .74$); (2) Decision Making/Risk Management (4 items, $\alpha = .83$); and (3) Conflict Resolution (2 items, $\alpha = .67$).

Perceived acceptability and perceived prevalence—Perceived peer acceptability of substance use was measured through three items (adapted from Hansen & Graham, 1991) that asked whether most of each participating student’s friends think it is okay for someone their age to smoke cigarettes, drink alcohol, and use marijuana ($\alpha = .77$). Response options were dichotomous such that a higher value represented agreement with the statement. Perceived prevalence of school-wide substance use was measured through three items (also adapted from Hansen & Graham, 1991) that asked the student how many learners their age at their school smoke cigarettes, drink alcohol, and use marijuana at least once a month ($\alpha = .78$). Students rated these questions on a scale of 0 (none of them) to 3 (most of them).

Adolescent substance use—For each substance, a new variable was created from two items adapted from Hansen & Graham (1991): a dichotomous item asking whether student used a particular substance in the past month; and the follow-up item for “yes” responses asking frequency of past month use. Responses for the alcohol item, for example, included 0 (did not use in the past month), 1 (1 or less drinks), 2 (2–3 drinks), and 3 (4 or more drinks). Then, composite scales were created representing past month frequency of alcohol, cigarette, and marijuana use (also known as gateway drugs since the use of these drugs commonly precede use of “hard” drugs, such as cocaine or heroin [Kandel, Yamaguchi, & Chen, 1992]; $\alpha = .64$) and past month frequency of methamphetamine and inhalant (“sniff glue, paint, or petrol”) use ($\alpha = .48$).

Delinquency—A delinquency scale was created using five items adapted from various large-scale youth surveys (Centers for Disease Control, 2007; Developmental Studies Center, 2005; Elliott, 1995; Liang, Flisher, & Lombard, 2007). Students reported their past month occurrence of bullying others at school, physically fighting (“hit, slapped, or physically hurt someone”), trespassing (“broken into a house, school, shop, or other building without permission”), vandalism (“caused serious damage to property that did not belong to you”), and stealing something worth more than 100 Rand (approximately \$15 US; $\alpha = .73$). Response options were dichotomous such that a higher value represented past month occurrence of the behavior.

Covariates—Gender (coded as 0=male, 1=female) and students' prior substance use and delinquency were added as controls in the statistical models. Race and age were not included as covariates because the majority of our sample is of Coloured race and are from the same grade cohort in the study.

Analysis Plan

Our study goals were to examine the effects of life skills and perceived substance use norms (perceived acceptability and prevalence) on substance use (gateway drugs and harder drugs) and delinquency outcomes. Independent variables from Wave 4 (end of 9th grade) and were used to predict outcomes at Wave 5 (start of 10th grade). Multiple regression analyses were conducted for each dependent variable (DV) using SAS statistical software, version 9.2 (SAS Institute Inc., Cary, NC), controlling for gender, and using multiple imputation to deal with missing data.

Regression models were conducted without and with prior problem behaviors as covariates, respectively (i.e., an unconditional compared with a conditional model; Dwyer et al., 1989). The unconditional model assumes that *all* of the shared prediction with pretest measures of the DV belongs to the predictors; thus, prior problem behaviors are not included as covariates. The conditional model, which includes the pretest measure of the DV as a covariate, assumes that *none* of the shared prediction belongs to the predictors. However, it is more likely that *some* of the shared prediction does belong to the predictors. Johnson (2000) developed a statistical procedure for calculating the relative regression weight of independent variables in the presence of highly correlated predictors by dividing the shared prediction among predictors. We applied Johnson's (2000) procedure for calculating relative weights and significance values to draw attention to the contribution of our independent variables of interest while controlling for prior problem behavior and gender.

Testing the significance of the relative weights has not been an easy matter; however, when there are no missing data, a straightforward solution is possible. The solution we used in this article stems from certain symmetries in the special case of multiple regression with orthogonal predictors, in which all of the prediction is carried in the regression coefficients. In this special case, the squared t-value for each predictor is proportional to the R^2 attributable to each orthogonal predictor. Further, the sum of squared t-values is a constant regardless of the orthogonalization approach used. We obtained orthogonalized predictors using principal components and varimax rotated factor scores for our predictors. Then, we used these orthogonalized variables to predict our dependent variables and to calculate the sum of squared t-values. As a final step, we recalculate the squared t-values to be proportional to the relative weights (proportion of R^2) as calculated by the Johnson (2000) procedure. These recalculated t-values with p-values, based on complete cases analysis, appear in the results tables described below along with results based on multiple imputation for the regular regression analyses.

Results

Regression Analyses

Tables 1, 2, and 3 present all of the regression results, and Table 4 presents a summary of main results. The top panel of each table presents the unconditional model for both the regular regression analysis and for the relative weights analysis. The pretest measure of the DV was significant in all of the conditional models; these effects are not presented below. Predictors with at least one statistically significant effect are described here.

Alcohol, cigarette, and marijuana use—Table 1 presents the regression results for gateway drugs as the DV. Gender was associated with gateway drug use (males used more than females). The effect reached statistical significance in both relative weights models and in the unconditional model with regular regression. Perceived acceptability was positively related to later drug use, and was statistically significant in both unconditional models and in the relative weights version of the conditional model. Perceived prevalence was positively related to later drug use and was statistically significant in both unconditional models and in the relative weights version of the conditional model. The decision and risk management predictor was positive (better management, more drug use) in all four models. However, the effect was marginally significant in the regular regression version of the conditional model and was significant in the relative weights version of the conditional model.

Methamphetamine and inhalant use—Table 2 presents the results for methamphetamine and inhalant (hard drug) use as the DV. Better conflict resolution was associated with less drug use; the effect was significant for both versions of the unconditional model and for the regular regression version of the conditional model. The effect was marginally significant for the relative weights version of the conditional model. Perceived acceptability was positively related to use of these drugs (higher perceived acceptability was associated with more use). The effect was significant for both versions of the unconditional model and for the relative weights version of the conditional model. The effect was marginally significant for the regular regression version of the conditional model.

Delinquency—Table 3 presents the results for delinquency as the DV. Gender was negatively related to delinquency (males reported more delinquent behaviors than females). The effect was significant for both versions of the unconditional model and for the relative weights version of the conditional model. The effect was marginally significant for the regular regression version of the conditional model. Conflict resolution was also related to this outcome (better conflict resolution was associated with less delinquency). The effect was statistically significant for the relative weights version of both unconditional and conditional models. The effect was marginally significant for the regular regression version of the unconditional model. Perceived acceptability was positively related to delinquency (more perceived acceptability was associated with more delinquency). The effect was significant for both versions of the unconditional model and for the relative weights version of the conditional model.

Summary of main results—Table 4 presents the t-values for the significant findings ($p < .05$) for each outcome. Gender, perceived acceptability, and prevalence of gateway drug use were associated with later gateway drug use in the hypothesized direction. Decision and risk management skills were associated with later gateway drug use but not in the hypothesized direction. Conflict resolution skills and perceived acceptability were associated with later hard drug use in the hypothesized direction. Gender (being male), conflict resolution skills, and perceived acceptability were associated with later delinquency in the hypothesized direction.

Discussion

Overall, results suggest that different developmental processes connect gateway drug use, hard drug use, and delinquency. Perceived acceptability and perceived prevalence of peer (gateway) substance use were consistently associated with an adolescent's own gateway drug use, based on the relative weights in both the unconditional and conditional models. Experimentation with gateway drugs is prevalent during adolescence such that some substance use can be considered normative during this developmental period (e.g., Shedler

& Block, 1990). The influence of peer norms on adolescent substance use and development in general is well known, especially as peers increase in importance during adolescence (Brown & Larson, 2009). Further research on understanding the relation of peer norms to adolescent substance use could compare the relative effects of perceived peer substance use versus peers' actual substance use.

Our results suggest a slightly different story about hard drug use and delinquency. The lack of conflict resolution skills and perceived peer acceptability of gateway substance use were significantly associated with hard drug use and delinquency. Not surprisingly, our results showed the same "predictors" for hard substance use and delinquency since these problem behaviors are known to co-occur, possibly through common risk factors (Hawkins et al., 1988; Jessor & Jessor, 1977); however, a contribution of our study is that conflict resolution skills may be one way in which these problem behaviors are linked.

In South Africa many young people are exposed and vulnerable to ongoing violence. A recent study posited that there is a "culture of violence" in South Africa that manifests itself in the wider society, communities, schools, and families as a result of family dysfunction, poverty, violence perpetrated by students and by teachers through the use of corporal punishment (Centre for the Study of Violence and Reconciliation, 2010; van der Westhuizen & Maree, 2009). Given these circumstances it is likely that conflict resolution skills play a crucial role in helping adolescents negotiate the ongoing pressures and tensions in the school and may be critical to shaping adolescents' developmental opportunities and pathways.

Association with delinquent peers may be another common link between delinquency and hard drug use. While our measures addressed peer substance use norms, differential association (Matsueda, 1988) and social learning theories (Bandura, 1977), for example, would suggest that an adolescent who is more sensitive to the behavior of his or her peers would be susceptible to the influence of, and model, delinquent peers. Compared to the "normative" nature of gateway drug use during adolescence, the use of hard drugs, such as methamphetamines and inhalants, is non-normative. These substances are highly addictive and have severely negative implications for brain development and functioning, and physical health (Parry, Myers, & Plüddemann, 2004). It could be that associating with delinquent peers encourages further antisocial behavior and exposure to more severe substances, such as methamphetamines and inhalants. Future research should investigate what mediates the association between perceived peer acceptability of substance use and delinquency.

Anger and anxiety management skills were not associated with any of our outcomes. This was an unexpected result given that anger and poor self-regulation skills are known to be related to early adolescent substance use (Swaim, Oetting, Edwards, & Beauvais 1989; Wills, 1986). There are two possible explanations for this finding. First, it is possible that these important intrapersonal skills are overshadowed by the need for social skills, such as conflict resolution, in high risk contexts. Second, some research suggests that intrapersonal factors, such as anger and anxiety, may be less relevant for predicting substance use during adolescence as peers play a more prominent role (Swaim et al., 1989). Another unexpected result of our study was that higher decision and risk management skills were associated with gateway drug use. However, this was a limited finding as it was a significant association in only one of four models and may reflect the "normative" experimentation in gateway drug use during adolescence. Overall, more research is needed to explore the roles of life skills in high risk contexts such as South Africa.

In terms of gender, our results showed that males were more likely to engage in gateway substance use and delinquency, corresponding with known trends (Reddy et al., 2010).

However, we did not find any gender differences for methamphetamine and inhalant use in our study while other research has shown that males are more likely to try these hard drugs (Reddy et al., 2010).

Limitations

One limitation of this study is that all measures were based on students' self-report. Thus, the life skills measures represent an individual's perception of their ability to manage their anger, anxiety, decisions, risks, and conflict resolution values. Another limitation is that the study sample may not be representative of all South African adolescents because the majority of our sample were Coloured. It is also important to note that our study focused on individual-level characteristics and their associations with negative outcomes. From a social ecological theory perspective (Bronfenbrenner, 1995) there are clearly many other social and cultural factors that influence risk behaviors. As South Africa is still in the process of recovering from the lasting effects of apartheid, these issues are no doubt strong and further research should consider them. Despite these important limitations, however, our study highlighted the potential need for different prevention approaches to address adolescent gateway drug use rather than for hard drug use and delinquency.

Implications for Prevention

Study findings suggest that different prevention approaches may be needed depending on the type of substance targeted. A preventive and universal approach for decreasing gateway substance use should focus on changing adolescent perceptions about the acceptability and prevalence of substance use. As our study found that males were more likely than females to engage in gateway substance use as well as delinquency, further research is needed on the utility of gender-specific approaches to substance use and delinquency prevention.

The present study highlights that conflict resolution training may be a critical component in developing a targeted intervention focusing on higher-risk problem behaviors, such as methamphetamine and inhalant use and delinquency. Helping youth build a robust skill set for addressing multiple social and cultural pressures may better enable them to successfully avoid engaging in deleterious behaviors during adolescence and beyond. Without such skills, youth may resort to delinquency and hard drug use such as those in this study.

Due to the link between hard drug use and delinquency, prevention programs may need to address both of these behaviors in tandem (Hawkins et al., 1988). Program developers should note, however, that addressing co-occurring adolescent substance use and delinquency in the same prevention program may be not be as simple as combining what is known separately about substance use and delinquency. Research in the U.S. has shown an "intensification effect" of co-occurring substance use and delinquent behaviors in which the impact of co-occurring substance use and delinquency is more than simply double the effect of each problem behavior alone. For example, Tubman, Gil, and Wagner (2004) found that rates of adolescent substance use and delinquency were four times higher than those of adolescents who reported engaging in only substance use or delinquency. Prevention efforts attempting to reduce these co-occurring behaviors may need to be especially strengthened and warrant further research.

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Table 1

Multiple Imputation Parameter Estimates for Alcohol, Cigarette, and Marijuana Use

| Unconditional Model | | | | | | | | | |
|-------------------------|--|-----------|-----------|------|----------|--|-------|----------|----------|
| Variable | Regular Multiple Regression (with Multiple Imputation) | | | | | Relative Weights (with Complete Cases) | | | |
| | <i>b</i> | <i>SE</i> | <i>df</i> | FMI | <i>t</i> | <i>p</i> | RW | <i>t</i> | <i>p</i> |
| Gender | -0.200 | 0.065 | 797.73 | 0.35 | -3.05 | 0.002 | 0.111 | 2.439 | 0.0151 |
| Anger/anxiety mgmt | 0.000 | 0.052 | 1051.80 | 0.31 | 0.00 | NS | 0.006 | 0.567 | NS |
| Decision/risk mgmt | 0.024 | 0.051 | 749.24 | 0.37 | 0.47 | NS | 0.031 | 1.289 | NS |
| Conflict resolution | -0.029 | 0.037 | 990.28 | 0.32 | -0.79 | NS | 0.018 | 0.982 | NS |
| Perceived acceptability | 0.203 | 0.040 | 778.14 | 0.36 | 5.06 | <.0001 | 0.594 | 5.643 | <.0001 |
| Perceived prevalence | 0.138 | 0.042 | 644.90 | 0.39 | 3.28 | 0.001 | 0.24 | 3.587 | 0.0004 |
| Conditional Model | | | | | | | | | |
| Variable | Regular Multiple Regression (with Multiple Imputation) | | | | | Relative Weights (with Complete Cases) | | | |
| | <i>b</i> | <i>SE</i> | <i>df</i> | FMI | <i>t</i> | <i>p</i> | RW | <i>t</i> | <i>p</i> |
| Gender | -0.075 | 0.055 | 365.14 | 0.52 | -1.36 | NS | 0.012 | 2.438 | 0.0152 |
| Anger/anxiety mgmt | -0.006 | 0.041 | 492.83 | 0.45 | -0.15 | NS | 0.002 | 0.995 | NS |
| Decision/risk mgmt | 0.072 | 0.043 | 346.62 | 0.54 | 1.68 | 0.090 | 0.011 | 2.334 | 0.020 |
| Conflict resolution | 0.004 | 0.034 | 471.93 | 0.46 | -0.14 | NS | 0.002 | 0.995 | NS |
| Perceived acceptability | -0.001 | 0.034 | 392.51 | 0.50 | -0.02 | NS | 0.063 | 5.586 | <.0001 |
| Perceived prevalence | 0.026 | 0.035 | 339.55 | 0.54 | 0.75 | NS | 0.027 | 3.657 | 0.0003 |
| Prior substance use | 0.745 | 0.042 | 265.48 | 0.61 | 17.61 | <.0001 | 0.884 | 20.926 | <.0001 |

FMI = fraction of missing information. RW = relative weight as proportion of R^2 .

Table 2

Multiple Imputation Parameter Estimates for Methamphetamine and Inhalant Use

| <u>Unconditional Model</u> | | | | | | | | | |
|----------------------------|---|-----------|-----------|-------|----------|---|-------|----------|----------|
| Variable | <u>Regular Multiple Regression (with Multiple Imputation)</u> | | | | | <u>Relative Weights (with Complete Cases)</u> | | | |
| | <i>b</i> | <i>SE</i> | <i>df</i> | FMI | <i>t</i> | <i>p</i> | RW | <i>t</i> | <i>p</i> |
| Gender | 0.044 | 0.078 | 490.2 | 0.452 | 0.56 | NS | 0.108 | 1.516 | NS |
| Anger/anxiety mgmt | 0.024 | 0.060 | 695.4 | 0.379 | 0.40 | NS | 0.011 | 0.484 | NS |
| Decision/risk mgmt | -0.014 | 0.060 | 469.02 | 0.462 | -0.23 | NS | 0.010 | 0.461 | NS |
| Conflict resolution | -0.132 | 0.047 | 421.11 | 0.487 | -2.83 | 0.005 | 0.293 | 2.496 | 0.013 |
| Perceived acceptability | 0.183 | 0.055 | 295.4 | 0.582 | 3.36 | 0.001 | 0.478 | 3.188 | 0.002 |
| Perceived prevalence | 0.001 | 0.048 | 513.63 | 0.441 | 0.02 | NS | 0.100 | 1.458 | NS |
| <u>Conditional Model</u> | | | | | | | | | |
| Variable | <u>Regular Multiple Regression (with Multiple Imputation)</u> | | | | | <u>Relative Weights (with Complete Cases)</u> | | | |
| | <i>b</i> | <i>SE</i> | <i>df</i> | FMI | <i>t</i> | <i>p</i> | RW | <i>t</i> | <i>p</i> |
| Gender | 0.142 | 0.067 | 276.2 | 0.472 | 1.95 | 0.052 | 0.073 | 1.599 | NS |
| Anger/anxiety mgmt | -0.015 | 0.048 | 372.57 | 0.433 | -0.26 | NS | 0.003 | 0.324 | NS |
| Decision/risk mgmt | 0.030 | 0.048 | 330.18 | 0.511 | 0.52 | NS | 0.009 | 0.562 | NS |
| Conflict resolution | -0.100 | 0.034 | 405.71 | 0.527 | -2.27 | 0.023 | 0.098 | 1.853 | 0.065 |
| Perceived acceptability | 0.091 | 0.042 | 256.85 | 0.569 | 1.83 | 0.068 | 0.133 | 2.159 | 0.031 |
| Perceived prevalence | 0.023 | 0.039 | 309.59 | 0.484 | 0.52 | NS | 0.048 | 1.297 | NS |
| Prior substance use | 0.435 | 0.054 | 215.54 | 0.819 | 5.84 | <.0001 | 0.635 | 4.717 | <.0001 |

FMI = fraction of missing information. RW = relative weight as proportion of R^2 .

Table 3

Multiple Imputation Parameter Estimates for Delinquency

| <u>Unconditional Model</u> | | | | | | | | | |
|----------------------------|---|-----------|-----------|------------|----------|---|-----------|----------|----------|
| Variable | <u>Regular Multiple Regression (with Multiple Imputation)</u> | | | | | <u>Relative Weights (with Complete Cases)</u> | | | |
| | <i>b</i> | <i>SE</i> | <i>df</i> | <i>FMI</i> | <i>t</i> | <i>p</i> | RW | <i>t</i> | <i>p</i> |
| Gender | -0.235 | 0.069 | 297.67 | 0.58 | -3.41 | 0.001 | 0.415 | 3.651 | <.0001 |
| Anger/anxiety mgmt | -0.017 | 0.051 | 429.77 | 0.48 | -0.34 | NS | 0.002 | 0.253 | NS |
| Decision/risk mgmt | 0.036 | 0.05 | 356.03 | 0.53 | 0.72 | NS | 0.012 | 0.621 | NS |
| Conflict resolution | -0.066 | 0.035 | 472.15 | 0.46 | -1.87 | 0.060 | 0.148 | 2.18 | 0.030 |
| Perceived acceptability | 0.118 | 0.043 | 276.89 | 0.501 | 2.74 | 0.007 | 0.335 | 3.281 | 0.001 |
| Perceived prevalence | 0.026 | 0.041 | 344.53 | 0.539 | 0.64 | NS | 0.088 | 1.681 | 0.093 |
| <u>Conditional Model</u> | | | | | | | | | |
| Variable | <u>Regular Multiple Regression (with Multiple Imputation)</u> | | | | | <u>Relative Weights (with Complete Cases)</u> | | | |
| | <i>b</i> | <i>SE</i> | <i>df</i> | <i>FMI</i> | <i>t</i> | <i>p</i> | RW | <i>t</i> | <i>p</i> |
| Gender | -0.119 | 0.067 | 276.2 | 0.602 | -1.78 | 0.076 | 0.092 | 2.976 | 0.003 |
| Anger/anxiety mgmt | -0.023 | 0.048 | 372.57 | 0.518 | -0.47 | NS | 0.002 | 0.439 | NS |
| Decision/risk mgmt | 0.072 | 0.048 | 330.18 | 0.55 | 1.51 | NS | 0.014 | 1.161 | NS |
| Conflict resolution | -0.046 | 0.034 | 405.71 | 0.496 | -1.38 | NS | 0.04 | 1.962 | 0.050 |
| Perceived acceptability | 0.057 | 0.042 | 256.85 | 0.624 | 1.38 | NS | 0.075 | 2.687 | 0.007 |
| Perceived prevalence | 0.032 | 0.039 | 309.59 | 0.568 | 0.83 | NS | 0.033 | 1.782 | 0.075 |
| Prior delinquency | 0.371 | 0.054 | 215.54 | 0.681 | 6.88 | <.0001 | 0.744 | 8.462 | <.0001 |

FMI = fraction of missing information. RW = relative weight as proportion of R^2 .

Table 4

Summary of Main Results (t-Values Displayed)

| Gateway Drugs | Regular Regression | | Relative Weights | |
|--------------------------|--------------------|--------------|------------------|-------------|
| | UC | Cond. | UC | Cond. |
| Perceived acceptability | +5.06 | -0.02 | 5.64 | 5.59 |
| Perceived prevalence | +3.28 | +0.75 | 3.59 | 3.66 |
| Decision/risk management | +0.47 | <i>+1.68</i> | 1.29 | <i>2.33</i> |
| Hard Drugs | | | | |
| Conflict resolution | -2.83 | -2.27 | 2.50 | 1.85 |
| Perceived prevalence | +3.36 | +1.83 | 3.19 | 2.16 |
| Delinquency | | | | |
| Conflict resolution | -1.87 | -1.38 | 2.18 | 1.96 |
| Perceived prevalence | +2.74 | +1.38 | 3.28 | 2.69 |

Note. Effects (t-values) in bold are significant ($p < .05$) in the predicted direction. Effects in italics and underscored are significant or marginal in the direction opposite from what was predicted. All other effects were non-significant. Relative weights, as percents of R^2 , are all positive. UC = Unconditional Model (omitted pretest of DV); Cond. = Conditional Model (included pretest of DV as covariate).