Psychosocial correlates of alcohol and other substance use among low-income adolescents in peri-urban Johannesburg, South Africa: A focus on gender differences

Jessica F Magidson[1], **Janan Dietrich**[2], **Kennedy N Otwombe**[2], **Kathleen J Sikkema**[3], **Ingrid T Katz**[4], and **Glenda E Gray**[2]

[1]Department of Psychiatry, Massachusetts General Hospital/Harvard Medical School, Boston, MA, USA

[2]Perinatal HIV Research Unit, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

[3]Department of Psychology and Neuroscience and Duke Global Health Institute, Duke University, Durham, NC, USA

[4]Division of Women's Health, Brigham and Women's Hospital/Harvard Medical School, Boston, MA, USA

Abstract

Alcohol and other drug use is prevalent among peri-urban, South African adolescents. We identified correlates of alcohol and other drug use by gender among adolescents (age = 16–18 years; $N = 822$) in peri-urban Johannesburg. Interviewer-administered surveys assessed sexual activity, alcohol and other drug use, and relevant psychosocial factors. In separate logistic regression models of alcohol and other drug use stratified by gender, violence exposure and sexual activity were associated with alcohol use for both males and females. For females only, depressive symptoms were associated with drug use. For males only, being older and sexually active were associated with drug use. Substance use interventions for South African adolescents should consider psychological health, sexual health, and tailoring by gender.

Keywords

adolescence; alcohol; depression; drinking; drugs; sexual health

Introduction

Alcohol and other drug (AOD) use among adolescents is a significant global public health threat (Fuhr et al., 2013). In regions of the world where young people are living in poverty,

AOD use is reaching epidemic levels, including among adolescents living in peri-urban areas of South Africa (Reddy et al., 2013). Epidemiologic data in South Africa have shown that nearly half of school-age adolescents reported ever having used alcohol, and approximately 35 percent reported alcohol consumption in the past month (Reddy et al., 2007, 2013). Regarding drug use, 13 percent of 16-year olds in South Africa report illicit drug use in their lifetime, whereas this number has been found to jump to 22 percent by age 17 (Reddy et al., 2007).

AOD use among adolescents is associated with increased likelihood of HIV transmission risk behavior (Kalichman et al., 2007). In South Africa specifically, where there is the largest number of individuals living with HIV/AIDS in the world (UNAIDS, 2014), HIV incidence remains high in adolescence, with an estimated 139,000 new infections in 2012 among individuals aged 15–24 years (Shisana et al., 2014). Of those, an estimated 113,000 were among females (Shisana et al., 2014). A recent report by the Human Science Research Council in South Africa identified alcohol users and recreational drug users after age 15 as two of the highest risk groups in need of HIV prevention efforts (Shisana et al., 2014). Any alcohol or drug use in adolescence, given the lower and often unknown physiological thresholds for metabolizing alcohol and other substances, can be associated with greater disinhibitory effects of alcohol, concurrent psychosocial problems, and subsequent substance use disorders (DeWit et al., 2000; Ramsoomar and Morojele, 2012). Intervening to identify and address AOD use in mid-adolescence may increase the success of interventions to prevent future substance use disorders and HIV acquisition.

Additionally, important gender differences in AOD use among adolescents in South Africa have been noted (e.g. Flisher et al., 2003; Patrick et al., 2009; Ramsoomar et al., 2013; Reddy et al., 2007, 2010, 2013). School-age males were approximately two and a half times more likely than school-age females to use alcohol (Ramsoomar et al., 2013) and over two times more likely to use drugs, including marijuana (Reddy et al., 2010). However, other research in South Africa has also found greater increases in alcohol use among females only (Ramsoomar and Morojele, 2012). Given the distinct patterns of AOD use for adolescent males versus females noted in prior literature in South Africa (e.g. Flisher et al., 2003; Patrick et al., 2009; Ramsoomar et al., 2013; Ramsoomar and Morojele, 2012; Reddy et al., 2007, 2010, 2013), efforts to understand psychosocial correlates of AOD use in mid-to-late adolescence, when rates of initiation and escalation of AOD use are highest (Wagner and Anthony, 2002), should stratify by gender when examining correlates of AOD use.

In this study, we investigated the association of psychosocial factors identified prior as being related to AOD use among adolescents in South Africa at multiple levels relevant to adolescent health behavior. We followed Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1989) to examine factors at the individual microsystem level (depression, self-esteem), the family/peer mesosystem level (parent–adolescent communication, sexual activity), and the larger community exosystem (exposure to violence). We expanded upon prior research examining relationships between AOD use and mental health factors, sexual risk-taking, and violence among adolescents in South Africa (Brook et al., 2006; Carney et al., 2013; Plüddemann et al., 2012); specifically, we assessed psychosocial correlates of AOD use stratified by gender in a diverse sample of mid-to-late adolescents in peri-urban

South Africa. By examining distinct correlates by gender, we hope findings will inform targeted interventions for AOD use among adolescent males and females.

Methods

Procedure

Adolescents (age=16–18years; *N*= 822) were recruited from October 2008 to 2009 using a stratified sampling approach from four pre-identified, low socioeconomic, peri-urban areas outside of Johannesburg, South Africa: Soweto, Eldorado Park, Lenasia, and Brixton. Black adolescents were recruited from each of the 40 townships comprising Soweto, which were considered a stratum. Colored, Indian, and White adolescents were stratified by area from among Eldorado Park, Lenasia, and Brixton, respectively. Convenience sampling was employed within each stratum for all racial/ethnic groups. This analysis was part of a larger study that investigated risk factors for HIV acquisition among adolescents in South Africa (Dietrich et al., 2013; Otwombe et al., 2011). In the primary study, enrollment was conducted using a 60:40 percent split (9 girls:5 boys) because females are disproportionately affected by HIV in South Africa. Field workers led recruitment efforts and focused their efforts near high schools, youth organizations, and malls during popular times for adolescent attendance, with follow-up via telephone to schedule interviews. Interested participants were informed that a research study was taking place focused on understanding adolescents' relationships, psychosocial situations, sexual behavior, and substance use. Interviews were later scheduled and conducted at a private venue, either a specified location near the participant's home or at the host institution site near Soweto, depending on participant preference. Written consent was obtained from each participant to allow for the data to be saved and used for research purposes. For those under the age of 18 years, written parental consent and participant assent were obtained at the study visit prior to participants being enrolled. Age was verified with identity/birth certificate documents. Interviews were conducted in English, although trained fieldworkers conducting the interviews were fluent in the relevant local languages to translate when needed. The assessment was a 90-minute, face-to-face, interviewer-administered paper and pencil questionnaire. The questionnaire assessed demographics, sexual activity, and other psychosocial factors relevant to substance use (assessments detailed below). Participants were reimbursed ZAR50 (~USD7). Institutional review boards at the University of the Witwatersrand and Duke University reviewed and approved the study protocol.

Assessments

Assessments included psychosocial factors relevant to substance abuse, including the following:

Socio-demographic information—Participants reported gender, age, and race.

Depressive symptoms—The Children's Depression Inventory (CDI; Kovacs, 1992) assessed depressive symptoms over the past 2 weeks. Each of 27 items was scored from 0 to 2 and summed as a continuous, total score. Internal consistency was good for this scale (α = .79). A score of greater than 19 is considered depressed.

Self-esteem—Self-esteem was assessed using the Rosenberg Self-Esteem Scale (Rosenberg, 1965), which has been previously used to assess self-esteem among another sample of South African adolescents (Dietrich et al., 2013). This scale consists of 10 items. Response options ranged from "strongly agree" to "strongly disagree," with higher scores indicating better self-esteem. The scale is scored as three categories: low, normal, or high self-esteem (low < 15; normal 15 25; and high > 25). Internal consistency was adequate in our sample (α = .75).

Parent–Adolescent Communication Scale—Parent–adolescent communication was assessed using the 11-item Parent–Adolescent Communication Scale (PACS), which has been previously validated in South Africa (Coetzee et al., 2014; Dietrich et al., 2013; Sales et al., 2008). This scale assesses communication across a variety of topics, such as sex-related issues, how to use condoms, sexually transmitted infections, HIV/AIDS, and pregnancy/getting someone pregnant. Responses are on a 4-point Likert scale (never, rarely, sometimes, and often). Higher scores indicate better communication. Scores were categorized into low or high parent–adolescent communication based on a median split to be consistent with prior administration of this measure in a South African adolescent sample (Dietrich et al., 2013). Internal consistency in this sample was good (α = .84).

Witnessed an act of violence—Witnessed an act of violence was assessed in this analysis using a single item from an adapted version of the Trauma Events Questionnaire (TEQ; Kaplan et al., 1995; Otwombe et al., 2015; Vrana and Lauterbach, 1994), which assessed lifetime exposure to traumatic events: "Have you ever witnessed an act of violence?" (coded as yes/no).

Sexual behavior—Participants reported whether they ever had vaginal or anal sex (Sikkema et al., 2004). Sexually active was coded as ever having had penetrative anal or vaginal intercourse.

AOD—AOD use was assessed using two self-report questions based on prior research with adolescents living in low-income areas (Sikkema et al., 2005). *Drug use* was assessed as "Have you ever, even once, used any drug just to get high?" (yes/no). Adolescents indicated whether they have used any of the following locally used substances in the past 6 months: cannabis (marijuana/pot/dagga), mandrax/buttons, glue, heroin, cocaine/coke, crack/rocks, petrol/benzene, ecstasy/pills, LSD/acid, and other. *Alcohol use* was assessed as "Have you been using alcohol in the last 6 months?" (yes/no).

Statistical analyses

Bivariate analyses were conducted using all sociodemographic and psychosocial variables (gender, age, depression, self-esteem, parent–adolescent communication, violence, and sexual activity) with both outcome variables (alcohol use in the past 6 months and lifetime drug use). Alcohol use was coded "yes" if the participant reported using alcohol in the past 6 months. Drug use was coded "yes" if the participant reported ever getting high on drugs. Bivariate analyses were first conducted using the entire sample and then analyses were stratified by gender. Next, adjusted multivariable logistic regression analyses were

conducted to examine correlates of lifetime drug use and past 6 months of alcohol use (in separate models for each outcome) stratified by gender. Independent variables included in both multivariable models were gender, age, depression, self-esteem, parent–adolescent communication, violence, and sexual activity. Model fit was assessed using the Hosmer–Lemeshow (H-L) goodness-of-fit statistic ($p > .05$ indicates good fit for the logistic regression model). All analyses were run in SPSS version 21.

Results

Participants

A total of 1184 participants were approached to participate in this study. Of those, 362 were not enrolled for the following reasons: not interested ($n = 157$), scheduled an interview but did not show ($n = 203$), and unknown/other ($n = 2$). A total of 822 participants consented to participate and were enrolled, including 506 Black adolescents (62%), 107 Coloured (South African term for mixed heritage) adolescents (13%), 106 Indian adolescents (12%), and 103 White adolescents (13%). Participants were 57 percent female, and mean age was 17 ($SD=0.83$)years. Regarding substance use, 53 percent of the sample had used alcohol in the past 6 months, and 20 percent had ever used drugs. Of those who had used drugs, marijuana was the most commonly reported substance (68.9% of participants who had ever used drugs reported marijuana use in the past month).

Psychosocial characteristics by gender—Table 1 lists the descriptive statistics for the total sample and by gender. Of the total sample, 67 percent reported having witnessed an act of violence in their lifetime, and 47 percent of the sample reported being sexually active (see Table 1). Females reported significantly greater depressive symptoms than males ($p < .001$). A higher percentage of males reported being sexually active than females (59% vs 39%; $p < .0001$). A higher percentage of males also reported low levels of parent–adolescent communication compared to females (59% vs 44%; $p < .0001$).

Psychosocial characteristics by alcohol and drug use—Table 2 lists the descriptive statistics for the sample by substance use (lifetime drug use and past 6 months of alcohol use separately). Comparing adolescents who reported ever using drugs versus not having used drugs, there were significant differences in all psychosocial characteristics except for parent–adolescent communication. Adolescents who reported ever having used drugs were predominantly male (65.3%; $p < .0001$), older (M age=17.25, SD=0.78; $p < .0001$), and compared to adolescents who never used drugs, had greater depressive symptoms (M= 11, SD=7.25 vs M= 9, SD =6.1; $p = .001$), lower self-esteem (11% vs 3% reported low self-esteem; $p < .0001$), were more likely to have witnessed an act of violence (76% vs 35%; $p < .005$) and be sexually active (69% vs 42%; $p < .0001$).

Comparing adolescents based upon self-reported alcohol use in the past 6 months, those who had used alcohol were more likely to be male (52% vs 33%; $p < .0001$), report witnessing an act of violence (79% vs 55%; $p < .0001$) and be sexually active (62% vs 31%; $p < .0001$) compared to adolescents who had not used alcohol in the past 6 months. Given the significant gender differences in rates of lifetime drug use and past 6 months of alcohol use, all logistic regression analyses were conducted separately by gender in Tables 3 and 4.

Modeling drug use by gender—Table 3 examines psychosocial predictors of drug use, presenting separate models for males and females. In the multivariable models, among females, only greater depressive symptoms were associated with drug use (adjusted odds ratio (AOR) = 1.06, 95% confidence interval (CI) = 1.01–1.11). Sexual activity was of borderline significance in relation to drug use among females in the multivariable model (AOR = 1.83, 95% CI = 0.99–3.39). Among males, being older (17 vs 16 years: AOR = 2.26, 95% CI = 1.18–4.36; 18 vs 16 years: AOR = 1.92, 95% CI = 1.01–3.68) and sexually active were associated with drug use (AOR = 2.16, 95% CI = 1.26–3.68). For both males and females, the H-L statistic indicated good model fit (males: χ^2= 13.35, $p >$ .05; females: χ^2= 9.87, $p >$ .05).

Modeling past 6 months of alcohol use by gender—Table 4 presents psychosocial predictors of past 6 months of alcohol use, with separate models for males and females. Having witnessed violence and being sexually active were associated with past 6 month alcohol use for both males and females. Among females, having witnessed violence and being sexually active each was associated with a 2.5 increased odds of past 6 months of alcohol use in the multivariable models (violence: AOR=2.42, 95% CI=1.58–3.69; sexually active: AOR=2.41, 95% CI=1.60–3.64). Among males, having witnessed violence and being sexually active each was associated with a four-fold increased odds of past 6 months of alcohol use in the multivariable models (violence: AOR=3.68, 95% CI=2.18–6.20; sexually active: AOR=4.16, 95% CI=2.50–6.92). For both males and females, the H-L statistic indicated good model fit (males: $\chi^2 = 14.30$, p > .05; females: χ^2=10.34, p>.05).

Discussion

This study examined distinct correlates of AODusebygenderfollowingBronfenbrenner's ecological systems theory (Bronfenbrenner, 1989), including individual-level (depression and self-esteem), family/peer-level (parent–adolescent communication and sexual activity), and community-level (exposure to violence) factors among a diverse sample of mid-to-late adolescents in peri-urban Johannesburg, South Africa. Our results showed that over half of the sample had used alcohol in the past 6 months, and one in five reported using illicit drugs, with marijuana being the most commonly reported substance. Rates of AOD use identified in this sample are in line with epidemiological data from South Africa. The South Africa Youth Risk Behavior Survey (YRBS) has reported lifetime prevalence of alcohol use among adolescents to be approximately 49 percent (Reddy et al., 2003, 2010, 2013). At the age of 17 years, approximately 22 percent of adolescents in South Africa had used illicit drugs (Reddy et al., 2007), which is similar to the rates reported in our sample (20%). In our analyses stratified by gender, witnessing violence and sexual activity were associated with alcohol use (for both males and females); for females only, depressive symptoms were associated with drug use. Meanwhile for males only, being older and sexually active were associated with drug use.

Violence exposure was associated with alcohol use in the past 6 months for both male and female adolescents, and over two-thirds of the sample had witnessed an act of violence. The high rates of violence and its association with alcohol use in this population may reflect alcohol use as a means of coping with exposure to violence (Flannery et al., 1998, 2003).

Alternatively, this association may reflect adolescents who use alcohol may spend more time in high-risk environments (e.g. illegal drinking establishments) or with negative peer groups and consequently may be exposed to violence at higher rates compared to adolescents who do not drink. Although the directionality of this relationship cannot be pinpointed in the current analyses, the findings warrant further attention to address the mental health needs of adolescents who are exposed to violence in South Africa (Morojele and Brook, 2006).

Almost half of the sample reported being sexually active. Sexual activity was associated with past 6 months of alcohol use among both males and females in the multivariable model. Sexual activity was significantly associated with drug use among males in the multivariable model and was of borderline significance in relation to drug use among females in the multivariable model (p= .054). Although the assessment of sexual activity used in this analysis does not necessarily indicate risky sexual behavior, the strong relationship between sexual activity and AOD use is concerning given greater likelihood of sexual risk behavior in the context of alcohol use (Kalichman et al., 2007) and the relationship between early sexual activity and greater likelihood of HIV transmission and sexual risk-taking among adolescents in South Africa (Reddy et al., 2010). The most recent national epidemiologic YRBS of school-age adolescents in South Africa found that of those who had ever had sex (36%), 18 percent had engaged in sex in the context of alcohol, and 13 percent had engaged in sex after taking drugs (Reddy et al., 2013). Although an assessment of sexual risk-taking in the context of AOD use was not included, the strong relationship between sexual activity and alcohol use in this study raises concern regarding the potential for sexual risk-taking in this population. Intervention efforts to reduce or prevent substance use disorders in this population may also consider addressing sexual health and safety in the context of the intervention.

Unique correlates of drug use by gender were depressive symptoms (among females only) and age (among males only). Greater depressive symptoms were associated with greater odds of drug use among females, and being older (17 or 18 vs. 16) was associated with greater odds of drug use among males. Findings are consistent with prior evidence that by mid-adolescence, internalizing symptoms, such as depression, are more prevalent among females when compared to males (Wade et al., 2002) and more strongly related to drug use (in particular for light/moderate levels of use; Waller et al., 2006). Depressive symptoms may contribute to initiation and continuation of drug use among females as a means to self-medicate in the face of negative affect (Green et al., 2012). Although a prospective, longitudinal design is necessary to ascertain developmental changes in this group, findings also suggest that there may be unique developmental correlates of drug use for males versus females depending on age. Although males have greater prevalence of AOD use overall in South Africa, recent increases in alcohol use among adolescent females (Ramsoomar and Morojele, 2012) warrant the current study's attention to gender differences in psychosocial correlates of use in this developmental stage. Among males, being older was only related to drug use (not alcohol use), which may reflect the developmental progression from alcohol use to drug use typical among adolescent males (Patrick et al., 2009).

Unexpected null findings included the lack of relationship between parent–adolescent communication and drug or alcohol use in bivariate and multivariable analyses, and a non-

significant relationship between self-esteem and past 6 months of alcohol use. These non-significant relationships may reflect the way in which AOD use was measured (i.e. it may not reflect problematic use), and past 6 months of alcohol use may be normative in this group; we may expect parent–adolescent communication to be most relevant to AOD use, and self-esteem to be most associated with alcohol use, when the assessment or inclusion criteria is limited to heavier, more problematic use.

Limitations

Findings must be interpreted with caution in light of key study limitations. First, as indicated previously, there are limitations of the crude assessment of AOD use included in this study that likely influence the interpretation of results. For both AOD use measures, "use" includes a lengthy period of time (i.e. the past 6 months and lifetime, for alcohol and drugs, respectively) and does not distinguish between severity of use. The "users" included in this assessment thus likely comprised a heterogeneous group of individuals (e.g. those who have used once, infrequent users, very regular users, and dependent users), and the assessment does not allow us to make those distinctions in our analyses. Although the measure of recent alcohol use does not distinguish hazardous or problematic use, prior research has suggested that any alcohol use in adolescence is troublesome, given the low physiological tolerance of alcohol at this development stage (Ramsoomar and Morojele, 2012), and that any adolescent use can contribute to later alcohol abuse and related problems into adulthood (DeWit et al., 2000). Furthermore, the timing of when the data was collected (2008–2009) may be a limitation regarding AOD use assessment, as it may not capture the most recent epidemiological patterns of AOD use among adolescents (Reddy et al., 2013). Other limitations include the use of interviewer-administered surveys, which may bias reporting of sensitive information such as AOD use or sexual activity, and the cross-sectional design. Without longitudinal assessment, we cannot infer causality of sociodemographic and clinical correlates in predicting substance abuse, rather only conclude that these factors are important correlates of retrospective reports of AOD use. Finally, findings must also be interpreted in light of this being a convenience sample, which may have biased our recruitment of high-risk adolescents who may have had higher rates of AOD use or a different substance use profile. Individuals with more severe or higher rates of AOD use may have been less likely to volunteer in a study that focused on substance use and sexual risk behaviors. Additionally, assessments were administered primarily in English, which may have also caused a selection bias; however, we aimed to address this potential limitation by having bilingual interviewers always available to translate and clarify concepts when needed.

Conclusion and future directions

Greater clinical and research attention to correlates of AOD use among adolescents in South Africa is needed, given continued associations of untreated AOD use with sexual risk-taking, violence, homicide, traffic-related accidents and injury, and other morbidity and mortality (Shisana et al., 2014). Alcohol users and recreational drug users over the age of 15 years have been identified by the Human Science Research Council in South Africa as two high-risk groups in need of targeted intervention efforts, given greatest risk of HIV exposure

(Shisana et al., 2014). This age period, 16–18 years, marks an important developmental stage where AOD use escalates and risk of HIV exposure heightens. Findings suggest that intervention efforts to address mental health issues (i.e. exposure to violence and depression) may be an important consideration alongside efforts to reduce AOD use and promote healthy sexual behavior in this population. Depending on the age (i.e. for older males) and type of substance use (i.e. for drug use), efforts to tailor interventions for gender may be warranted, for instance, a greater emphasis on depression for drug use intervention efforts among young women. Furthermore, given that less than half of the sample recruited was sexually active, this population may be in an important developmental window for intervention efforts to promote healthy sexual behavior prior to initiating sexual activity. If we can address substance use and promote sexual health prior to initiation of sexual activity, this may amplify the effectiveness of HIV prevention efforts in this population. Future research is needed to replicate the current findings, including assessments of substance use disorders and HIV transmission risk behavior. Intervention development research is sorely needed to adapt evidence-based programs to simultaneously address substance use and promote healthy sexual behavior in this population, and it is our hope that these findings may support tailoring future intervention efforts.

Acknowledgments

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Table 1

Descriptive statistics for predictor variables for the overall sample and by gender.

Variable	Overall (*N* = 822)	Male (*N* = 353)	Female (*N* = 469)	*p*-value
Age (years)				.25
16	275 (33.5%)	107 (30.3%)	168 (35.8%)	
17	254 (30.9%)	113 (32%)	141 (30.1%)	
18	293 (35.6%)	133 (37.7%)	160 (34.1%)	
Mean age (SD)	17.02 (0.83)	17.07 (0.82)	16.98 (0.84)	.12
Depression				.001
Mean depression score (SD)	9.40 (6.37)	8.59 (5.41)	10.01 (6.95)	
Self-esteem				.07
Low	39 (4.7%)	11 (3.1%)	28 (6.0%)	
Normal	620 (75.4%)	278 (78.8%)	342 (72.9%)	
High	163 (19.8%)	64 (18.1%)	99 (21.1%)	
PAC				<.0001
Low	414 (49.6%)	207 (58.6%)	207 (44.1%)	
High	408 (50.4%)	146 (41.4%)	262 (55.9%)	
Witnessed an act of violence?				.34
Yes (%)	552 (67.2%)	244 (69.1)	308 (65.7)	
No (%)	268 (32.6%)	109 (30.9)	159 (33.9)	
Sexually active?				<.0001
Yes (%)	388 (47.2%)	207 (58.6)	181 (38.6)	
No (%)	434 (52.8%)	146 (41.4)	288 (61.4)	

SD: standard deviation; PAC: parent–adolescent communication.

Totals may not equal sample size due to missing values. Sexually active = ever had anal or vaginal intercourse.

Table 2

Distribution of predictors of drug and past 6 months of alcohol use.

Variable	Drug use (n = 167)	No drug use (n = 652)	p-value	Alcohol use (n = 431)	No alcohol use (n = 389)	p-value
Gender			<.0001			<.0001
Male (%)	109 (65.3%)	244 (37.4%)		224 (52%)	129 (33.2%)	
Female (%)	58 (34.7%)	408 (62.6%)		207 (48%)	260 (66.8%)	
Age (years)			<.0001			.14
16	35 (21.0%)	239 (36.7%)		131 (30.4%)	143 (36.8%)	
17	55 (32.9%)	198 (30.4%)		137 (31.8%)	117 (30.1%)	
18	77 (46.1%)	215 (33.0%)		163 (37.8%)	129 (33.2%)	
Mean age	17.25 (.78)	16.96 (.83)	<.0001	17.07 (.82)	16.96 (.84)	.06
Depression	11.11 (7.25)	8.99 (6.06)	.001	9.42 (6.11)	9.41 (6.66)	.98
Self-esteem			<.0001			.98
Low	19 (11.4%)	20 (3.1%)		20 (4.6%)	19 (4.9%)	
Normal	118 (70.7%)	500 (76.7%)		325 (75.4%)	294 (75.6%)	
High	30 (18.0%)	132 (20.2%)		86 (20.2%)	76 (19.5%)	
PAC			.32			.288
Low	90 (53.9%)	323 (49.5%)		210 (48.7%)	204 (52.4%)	
High	77 (46.1%)	329 (50.5%)		221 (51.3%)	185 (47.6%)	
Witnessed an act of violence?			.005			<.0001
Yes (%)	127 (76.0%)	228 (35.0%)		339 (78.7%)	212 (54.5%)	
No (%)	39 (23.4%)	423 (64.9%)		91 (21.1%)	176 (45.2%)	
Sexually active?			<.0001			<.0001
Yes (%)	115 (68.9%)	272 (41.7%)		266 (61.7%)	122 (31.4%)	
No (%)	52 (31.1%)	380 (58.3%)		165 (38.3%)	267 (68.6%)	

PAC: parent–adolescent communication.

Totals may not equal sample size due to missing values. Drug use outcome variable is "ever gotten high." Sexually active = ever had anal or vaginal intercourse. Alcohol outcome variable is "alcohol use in past 6 months."

Table 3

Bivariate and multivariable models predicting drug use (ever getting high) stratified by gender.

Variable	Female				Male			
	Bivariate		Multivariable		Bivariate		Multivariable	
	OR (CI)	p	AOR (CI)	p	OR (CI)	p	AOR (CI)	p
Age (years)								
16	1	1	1	1	1	1	1	1
17	0.97 (0.45–2.08)	.93	0.93 (0.42–2.08)	.86	2.74 (1.47–5.12)	.002	2.26 (1.18–4.36)	.015
18	2.11 (1.10–4.05)	.026	1.44 (0.70–2.98)	.32	2.62 (1.42–4.81)	.002	1.92 (1.01–3.68)	.048
Depression	1.09 (1.05–1.13)	<.0001	1.06 (1.01–1.11)	.03	1.05 (1.00–1.09)	.04	1.03 (0.98–1.08)	.23
Self-esteem								
Low	1	1	1	1	1	1	1	1
Normal	0.14 (0.06–0.32)	<.0001	0.35 (0.12–1.03)	.06	0.26 (0.07–0.90)	.03	0.34 (0.08–1.44)	.14
High	0.22 (0.09–0.57)	.002	0.78 (0.21–2.95)	.71	0.19 (0.05–0.74)	.02	0.27 (0.05–1.31)	.10
PAC								
Low	1	1	1	1	1	1	1	1
High	0.56 (0.32–0.97)	.039	0.68 (0.37–1.28)	.23	1.46 (0.92–2.30)	.11	1.46 (0.89–2.38)	.13
Witnessed violence?								
No	1	1	1	1	1	1	1	1
Yes	1.87 (0.98–3.59)	.06	1.74 (0.87–3.48)	.12	1.65 (0.98–2.75)	.06	1.44 (0.83–2.50)	.20
Sexually active?								
No	1	1	1	1	1	1	1	1
Yes	2.54 (1.45–4.45)	.001	1.83 (0.99–3.39)	.054	2.71 (1.65–4.46)	<.0001	2.16 (1.26–3.68)	.005

OR: odds ratio; AOR: adjusted odds ratio; CI: confidence interval; PAC: parent–adolescent communication.

Dependent variable in all logistic regression analyses: "Have you ever gotten high on drugs?" Sexually active = ever had anal or vaginal intercourse.

Table 4

Bivariate and multivariable models predicting alcohol use in past 6 months stratified by gender.

Variable	Female				Male			
	Bivariate		Multivariable		Bivariate		Multivariable	
	OR (CI)	p	AOR (CI)	p	OR (CI)	p	AOR (CI)	p
Age (years)								
16	1	1	1	1	1	1	1	1
17	1.08 (0.68–1.70)	.75	0.94 (0.58–1.52)	.81	1.49 (0.86–2.60)	.15	1.06 (0.56–1.99)	.87
18	1.44 (0.93–2.23)	.10	1.00 (0.61–1.61)	.99	1.20 (0.71–2.02)	.50	0.82 (0.44–1.51)	.52
Depression	1.02 (0.99–1.04)	.23	1.01 (0.97–1.04)	.79	1.00 (0.95–1.03)	.52	0.97 (0.92–1.02)	.25
Self-esteem								
Low	1	1	1	1	1	1	1	1
Normal	0.92 (0.42–1.99)	.83	1.09 (0.43–2.78)	.86	0.96 (0.27–3.34)	.94	0.62 (0.13–2.97)	.55
High	0.91 (0.39–2.10)	.81	1.09 (0.37–3.20)	.87	1.17 (0.31–4.45)	.82	0.56 (0.10–3.15)	.51
PAC								
Low	1	1	1	1	1	1	1	1
High	1.27 (0.88–1.84)	.21	1.22 (0.81–1.82)	.34	1.38 (0.89–2.16)	.15	1.18 (0.71–1.97)	.52
Witnessed violence?								
No	1	1	1	1	1	1	1	1
Yes	2.54 (1.69–3.82)	<.0001	2.42 (1.58–3.69)	<.0001	4.26 (2.58–6.70)	<.0001	3.68 (2.18–6.20)	<.0001
Sexually active?								
No	1	1	1	1	1	1	1	1
Yes	2.49 (1.71–3.65)	<.0001	2.41 (1.60–3.64)	<.0001	4.61 (2.9–7.34)	<.0001	4.16 (2.50–6.92)	<.0001

OR: odds ratio; AOR: adjusted odds ratio; CI: confidence interval; PAC: parent–adolescent communication.

Dependent variable in all logistic regression analyses: "Have you used alcohol in past 6 months?" Sexually active = ever had anal or vaginal intercourse.